

INSTYTUT GEOGRAFII
POLSKIEJ AKADEMII NAUK

DOKUMENTACJA GEOGRAFICZNA

ZESZYT 1

INTERNATIONAL GEOGRAPHICAL UNION
COMMISSION ON AGRICULTURAL TYPOLOGY

AGRICULTURAL TYPOLOGY SELECTED METHODOLOGICAL MATERIALS

Edited by

JERZY KOSTROWICKI,
WIESŁAWA TYSZKIEWICZ



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PREFACE

As all the methodological materials presenting the results of the activities of the IGU Commission on Agricultural Typology are already out of print and the demand for them in view of the approaching next Commission meeting is growing, it has been decided to meet this demand by reprinting some more meaningful materials. Three articles have finally been selected.

The first article, reprinted in an unaltered form from *Geographia Polonica* vol. 14, being a paper presented to the joint meeting of the Congress Section of Economic Geography and the IGU Commissions on Applied Geography, Quantitative Methods and Agricultural Typology of the XXIst International Geographical Congress in New Delhi, 1968, discusses the concepts of agricultural typology and agricultural regionalization and their application to agricultural development.

The second one duplicated in 1967 is presenting the preliminary conclusions drawn from the replies to the Commission two methodological questionnaires. To make the publication more coherent, and not too heavy, both the introductory remarks and the report on the Commission activities in the years 1964—1966 and the discussion on agricultural typology, regionalization and development presented in the first article in a more elaborated way have been omitted. Some other omissions have also been made in other chapters of the text. The appendix to the original publication dealing with the methods of defining agricultural orientations has not been reprinted here.

The full report on the Commission activities in the years 1964—1968 as presented to the Commission Meeting in New Delhi in December 1968 together with further methodological remarks are in print and will appear in *Geographia Polonica* vol. 19. A more extensive study on methods of defining agricultural orientation being also in print will be published in *Geographia Polonica* vol. 18.

The third article is an attempt of the application of methodological concepts and methods as worked out and recommended by the Commission to the study of Polish agriculture. This paper, presented at the meeting of the IGU Commission on Agricultural Typology in New Delhi, 1968, is now in print and will be published in *Geographia Polonica* vol. 19.

The Editors

Jerzy KOSTROWICKI

AGRICULTURAL TYPOLOGY.
AGRICULTURAL REGIONALIZATION.
AGRICULTURAL DEVELOPMENT

Although an attempt to approach the areal problems of agriculture in a more synthetic way is as old as agricultural geography itself, the last thirty years have witnessed a great expansion of studies of what is known as agricultural systems, types of farming, agricultural types and regions, farming type regions etc., carried out on world, national or regional scale. As it was already pointed out several years ago¹, the results of those studies are hardly comparable or can be used for further syntheses, since the criteria, methods and techniques applied to determine types or regions vary greatly.

At the same time geography, at present no longer satisfied with merely describing the distributions of various phenomena over the earth's surface, seeks for a more synthetic approach to its problems. This, in view of growing specialization in geographical sciences, is becoming more and more difficult unless more accurate methods and techniques that enable comparative treatment of the objects studied and their scientific classifications are worked out and applied.

Besides, last but not least, the growing needs of world population for food and raw materials require not only con-

¹ Derwent Whittlesey, *Agricultural Regions of the World*, Ann. Ass. Am. Geogr., 26 (1936), pp. 144—240.

stant improvement of agricultural techniques but also some type of agricultural planning or programming. As any type of planning in general, the programmes of agricultural development require not only that studies of particular elements or phenomena should be made, but above all, a better and more synthetic knowledge of the subject which is to be planned, i.e. agriculture as a whole in relation to other — similar or different — more advanced agricultures. Such knowledge is of practical importance only when accurate methods, making comparisons possible, have been applied.

Here, the scientific and practical aims of agricultural studies meet, requiring both improvement and unification to a certain degree of methods and techniques used and also a more synthetic study of agricultural phenomena and their typological and regional classifications.

To cope with all these problems a special IGU Commission for Agricultural Typology was established in 1964.

The tasks of the Commission were determined as follows².

(1) to establish the principles, criteria, methods and techniques of agricultural typology

(2) to initiate, to promote and to coordinate the regional studies on agricultural types based on the criteria recommended by the Commission

(3) to work out the typological and regional classifications of world agriculture.

To reach these aims two questionnaires on principles, basic notions, criteria, methods and techniques of agricultural typology were distributed in 1965 — 1966 among the interested scholars. Over 50 answers to the questionnaires provide a rich and interesting material, used as a basis for the present paper³.

² See IGU Newsletter, 16, 1965, 1, pp. 37 — 38.

³ See the answers to the questionnaires mimeographed: Principles, Basic Notions and Criteria of Agricultural Typology, Discussion on the Commission Questionnaire No. 1, Warsaw 1966, 66 p. and Methods and Techniques of Agricultural Typology. Discussion on the Commission Questionnaire No. 2., Boulder, Colorado 1967, 88 p.

AGRICULTURAL TYPOLOGY

In result of the discussion on the Commission questionnaires the following principles and basic notions for agricultural typology were accepted:

— “type of agriculture” without any adjective (tout court) should be accepted as the supreme notion in agricultural typology,

— type of agriculture should be understood in a broad meaning including all forms of crop growing and livestock breeding,

— type of agriculture should be understood as a hierarchical notion encompassing types of the lowest order, several intermediate orders of types, up to the highest ones — world types of agriculture,

— type of agriculture should be understood as a dynamic notion which changes either evolutionarily or revolutionarily along with the transformation of its basic characteristics,

— type of agriculture should be understood as a complex notion combining several aspects or characteristics of agriculture.

An agricultural holding, in the sense defined for the FAO international censuses, is considered to be a basic unit in agricultural typology. At the same time, however, despite all its deficiencies, in macro-scale studies and particularly when dealing with a large number of small-scale holdings for which no separate data are available (village agricultures etc.), there seems to be no other alternative than to use other units (e.g. administrative). We should be aware, however, that in doing so we have to deal with aggregate indices or averages for the areas in which a whole variety of characteristics of an agricultural holding are hidden in various ways. Such indices and averages might cover up various, often contrasting or complementary types of agricultural holdings and in consequence may reflect only more or less approximately the real pattern of agricultural characteristics. That is why even in the macro-

-scale typological studies the detailed surveys that not only check the magnitude of divergences between the averages and the real units of operation (agricultural holdings) but also assess the accuracy of statistical data are, wherever applicable, strongly recommended. On the other hand, once the agricultural types and their typifying characteristics have been distinguished on the basis of sample studies of individual holdings — the analysis of the range or distribution of those types over a given territory can be continued on the basis of statistical data reflecting only those characteristics.

In accordance with the opinions expressed by the majority of the answerers to the questionnaires and logic of any classification the definition of the type of agriculture should be based on internal or inherent characteristics of agriculture. External characteristics or rather conditions in which agriculture develops, however important they are for the explanation of the reasons why, and why exactly at a given place, a particular type of agriculture has developed, are not proper bases to determine types of agriculture.⁴

What are, however, these external conditions of agriculture?

It is obvious that each particular type of agriculture is the result of a combined action of a complex of social, technical, economic and cultural processes developing in defined natural conditions so that no type of agriculture develops in isolation but is associated with the natural, social, technical, economic and cultural environment of a given time and place.

It is, however, more debatable whether the natural environment should be considered as an external condition of agriculture or not. According to classical economics — land, understood broadly as all natural forces and conditions, together with labour and capital were considered to be the three main factors of agricultural production. It seems, however, that in the light of more recent development in geographical and related sciences, the uniform approach to the above three notions is no longer correct. While labour and capital (means of production) are actually such factors

inasmuch as they actively enhance or promote the development of agriculture, land or more generally speaking natural environment can hardly be considered a factor actively determining agricultural development. Nature does not create or develop by itself any form of agriculture, but it creates conditions which — being better or worse utilized by agriculture through labour or capital inputs — only limit to some extent technical or economical possibilities of agricultural development.

Irrespective of their order and the area studied, the definition of types of agriculture should always be based on the same general principles and criteria. The difference is that in case of types lower in hierarchy the search for more detailed differences would require more indices and sharper and more precised techniques. On the contrary, for types higher in hierarchy, the indices and measures could be more and more general and less numerous.

The incompleteness and paucity of data available in some countries will make it necessary to base some typological studies on estimates rather than on statistical data. But even in the most developed countries agricultural statistics do not often contain all the items required for a sound agricultural typology and are seldom fully accurate. So even in those countries the estimates are used in many typological and other synthetic studies.

But in the countries that “are not so well developed as they might be”⁴, where some data are either entirely lacking or incomplete and the statistics are not sufficiently reliable, the use of estimates based on a good knowledge of the country’s or regional problems is not only inevitable but might even give better results than the use of unreliable statistics. The differences in typological characteristics between particular types of agriculture are usually so great that if only their

⁴ W. Van Royen, The answer to the 1-st questionnaire, see Principles... pp. 63 — 66.

range is established it might be sufficient at least for macro-scale studies.

The criteria or inherent characteristics of agriculture could be classed into the following three main categories: those of the social, organizational-cum-technical (functional) or economic (productional) nature responding to the three principal questions viz. (1) who is the producer, (2) how the produce is obtained, and (3) how much, what and for what it is produced⁵. Accordingly, these three categories should be considered as defining jointly the type of agriculture and none of them could be omitted although their importance for distinguishing various types of agriculture may greatly vary.

The social characteristics of agriculture are those indicating who is the producer, whether he is the owner of the land he cultivates or the tenant, what is then the form or system of land ownership and operation, who provides labour and capital, what is the scale of operation, etc.

The organizational and technical characteristics are those indicating how the produce is obtained, what are the measures, practices and means applied to achieve agricultural production and to maintain soil fertility. They could be divided into the following three groups:

— organization of agricultural land i.e. what is the setting of land holding, its pattern, land fragmentation etc. in other words, the problems connected with what is known as agrarian structure and land utilization,

— measures and practices applied in the management of natural conditions (land forms, water, soil, climate etc.), in crop growing (land or crop rotation systems, perennial crop cultivations systems, systems of grassland use), in livestock breeding etc.

— intensity of these measures and practices i.e. the amount

⁵ For more details see J. Kostrowicki and N. Helburn, *Agricultural Typology, Principles and Methods* (mimeographed), Boulder, Colorado 1967.

of human, animal and mechanical labour applied (amount of labour and capital inputs = intensity of agriculture).

Production characteristics are those which indicate how much, what and for what it is produced i.e. what is the land, labour and capital productivity, what is the degree and level of commercialization of agricultural production and what are the dominant enterprises in agricultural production and in its commercial part (orientation and specialization of agriculture).

As a result of typological investigations several measures and indices characterizing various aspects of agriculture are usually obtained. The number of those indices varies according to the level and the accuracy of investigations. However, for the purposes of comparability a minimum set of such measures and indices should be established to characterize each possible type of agriculture of any order.

Yet it is too early to establish such a final and universal list of measures and indices. On the basis of up-to-date experience, of the answers to both questionnaires and of the discussions at the Commission meetings, the preliminary list of characteristics has been set up⁶, subject to change as a result of further discussions and testing studies initiated by the Commission in various countries. While some of those characteristics may be found of little importance, it is almost certain that some features characterizing non-European agricultures were omitted and therefore should be supplemented.

The definition of a certain number of typological characteristics does not solve the problem of agricultural typology. The next question is how can one, having more or less numerous indices that characterize agriculture, come to combine them in such a way as to arrive at a definition of the type of agriculture.

There are several methods of combining or integrating areal phenomena that could be of use here. They are ranging from most simple and primitive ones such as cartographic super-

⁶ See above.

position or scoring, through various graphic methods, cross-tabulation or deviations from model types, to the most sophisticated mathematical ones such as multifactor or other analyses. These methods should be tested as to their applicability to agricultural typology.

AGRICULTURAL REGIONALIZATION

Similarly to agricultural types the definition of agricultural regions should be based rather on inherent characteristics of agriculture itself than on the conditions in which it develops. This, however, does not lessen the importance, for both scientific and practical purposes, of the regions delineated on the basis of assessing natural and other external conditions of agriculture.

As agriculture is a complex phenomenon such regionalization would be of more importance if the requirements of particular practices and techniques, individual crops or animals raised, particular systems or orientations of agriculture are assessed in relation to the natural conditions as a whole, than when the individual elements of natural environment are assessed separately from the viewpoint of the whole agriculture.

At the same time it is fully advisable to assess the areal differentiation of the role played by agriculture in national or regional economy as reflected in the total land utilization, and in the relation of agriculture to industrialization or urbanization or the other external conditions. All the regional divisions resulting from the above are not, however, and should not be confused with agricultural regions.

The latter are to be singled out and delineated on the basis of combinations, complexes or patterns of agricultural characteristics, in other words, of types of agriculture.

Since the same agricultural characteristics are also to be applied to define types of agriculture, the question may be raised what is the real difference between agricultural type

and agricultural region. In fact, although the problem of differences between typological and regional classification has been widely discussed elsewhere, these two notions are often confused not only in agricultural geography.

The most simplified answer is that type and region belong to two different categories of concepts. Type is a systematic or taxonomic notion based on similarities or affinities between individual phenomena. Since certain associations of phenomena that determine particular types, repeat themselves in time and space, the same types could be found repeated in various periods or areas. As those sets of associations usually occur in space in the mosaic like pattern, the resulting types do not necessarily form any contiguous areas but usually are dispersed and intermingled with other types.

Region, on the contrary, is a spatial or territorial notion based on differences between individual areas rather than on the similarities or affinities. Consequently, region is a continuous portion of the earth's surface, extending within determined limits and characterized by a peculiar set of characteristics different from all the others, which impart it its unique character.

On the other hand, both type and region are hierarchical notions. The hierarchy of types is, however, of a systematic character. Based on their similarities, individual types of lower order are grouped together into the types of higher order irrespective of their distribution over the earth's surface, while regions of a lower order always form territorial parts of regions of a higher order, each of the latter comprising more than one region of a lower order.

In the past and sometimes also at present, agricultural regions have been delineated, by the same primitive methods of superposition or summation of the scores. The accurate delineation of agricultural regions, when typology has not been made, has to undergo the whole procedure that was many times discussed in connection with economic regions in general and with integrated, homogeneous regions in particular.

When agricultural typology has been made, the regionalization procedure can be restricted to the generalization of results obtained by agricultural typology. Regional units could thus be formed on the basis of dominance, co-dominance or co-existence of particular agricultural types in a given territory. It is, of course, desirable that the generalization is based on some precise methods.

The above principles refer to complex agricultural regions. At the same time, one can stress the need for more elementary or partial regions, based on individual elements of agriculture (rice, sugar cane, etc. regions or zones), and singled out by both natural measures and relative figures, or for more synthetic regions, based on total or particular social, functional or production characteristics (size of holdings, crop rotation systems, irrigation systems, productivity, commercialization, agricultural orientation, specialization etc.).

AGRICULTURAL DEVELOPMENT

A better knowledge of agriculture on a world, regional and national scale, and sharper methods and tools of investigation acquired from typological and regionalization studies not only serve scientific objectives but also may be of some practical importance. In particular they may be used for:

— better assessment of the present use of agricultural resources and its future possibilities,

— better assessment of agricultural characteristics impeding the development of individual types of agriculture and of other features that accelerate such a development,

— based on better understanding of the characteristics and achievements of the same or similar types of agriculture — a better definition of directions of further agricultural development through transformation of present types of agriculture into other, more effective ones.

It seems that between the typological procedure concerning the present state of agriculture and that relating to a desirable

one in the future, is not much difference as far as methods and techniques are concerned. Planning and programming of agricultural development is nothing else but an attempt to outline, on the basis of scientific premises, desirable future agricultural types and regions through prediction and change of their basic characteristics.

Once agricultural typology and good assessment of natural conditions in a given area are achieved, a careful study of the future external conditions, needs and possibilities of agriculture should follow. Possible changes in the general social structure and in technical level and economic status of the country or region concerning the general level of industrialization and urbanization, supply and demand for labour resources, food and industrial raw materials, degree of mechanization, future transportation facilities, accessibility to the markets and manufacturing centres, growth of the national income, foreign trade possibilities etc., etc. have to be assessed from the viewpoint of what is likely to be possible and practicable.

Having thus acquired a profound knowledge of the existing agriculture and its present and future potential possibilities one could proceed to establishing future model types of agriculture. These desirable and economical, perspective model types of agriculture to be attained in determined external conditions and in a determined period, understood as complexes, should be characterized each by a set of specific social, functional and production characteristics, by specific intensity, productivity and commercialization, by specific orientation and specialization.

Similarly to the typology of the present agriculture also the future model types can be built either on basic units (types of holdings), or on units of the higher order. And again the generalization of such perspective model types of agriculture can lead to the delineation of the future perspective agricultural regions, by similar methods and techniques to

those used in the delineation of the existing agricultural regions.

The final task consists in outlining ways of transition from the existing agricultural types and regions to the future, desirable ones that are possible to be attained.

In practice agricultural planning often proceeds directly from the study of natural conditions and potential possibilities to the desirable objectives determined in terms of areal units, yields of particular crops and productivity of animals. Such a method is both oversimplified and insufficient. First because proper realistic planning cannot give up the analysis of the present state of things, which particularly in agriculture cannot be changed or shaped optionally because of their natural or non-natural dependences. Secondly, planning is not realistic if the ways of transition from the present to future state of things are not accurately determined. Here again a good knowledge of the present state of agriculture is necessary. Finally, planning of separate indices or effects of agricultural production and delineating future agricultural regions on this basis, without knowing which agricultural characteristics should be changed in order to obtain the desirable effects, make the results of such planning equally unrealistic. Agriculture is not a simple sum of individual elements but a set or system of interrelated phenomena in which a change of one of them may result in a change of the other. Therefore any realistic and competent planning or programming of the agricultural development should take into account all important characteristics of agriculture, it should predict and estimate their possible changes and consider how these changes could affect other characteristics. In other words, it should consider the nature and the direction of the change in the types of agriculture from the present to the future ones.

Because of the complex character of agriculture and its dependence or sensitivity to changes of its natural and other external conditions, every plan of agricultural development should be general, specific and flexible. The plan should lend

itself to easy verification, change of transformation as more knowledge is gained with respect to the potential conditions and way of their use, to the present state of agriculture or in the event of changes in methods or objectives of planning.

Agricultural typology approaching with unified methods and techniques, world and regional problems of agriculture, giving a synthetic and comparable assessment of its present status and characteristics, based on the methods and techniques possible to apply in agricultural planning — may contribute to a better efficiency of such planning.

As we can see from the above, the whole problem of agricultural typology is important both for the future development of agricultural geography and for solving practical problems of agricultural development. But the task is hard and difficult and could be solved only by common efforts of the many.

May I end this paper with an appeal to all who feel interested in the problems presented above to join the Commission, and to help by discussing the principles, criteria and methods, by testing them in regional studies and by working out the agricultural typology on a world, regional and national scale.

AGRICULTURAL TYPOLOGY —
PRINCIPLES AND METHODS
PRELIMINARY CONCLUSIONS

OBJECTIVES OF AGRICULTURAL TYPOLOGY

...The scientific objectives that would be achieved by such a classification might be summarized as follows:

- A. Putting an order to the present da- knowledge of world agriculture and its areal similarities, differentiation, and interrelationships.
- B. Contributing to the better understanding of agriculture as a complex phenomenon on world, continental and national scale.
- C. Creating better foundations for further synthetic studies of agriculture on different scale and level.
- D. Developing agricultural geography as scientific discipline.

Along with these scientific results, the acquiring of a better knowledge of agriculture in its areal differentiation and the gaining of sharper tools for its investigation may be of some practical importance in:

- A. Better assessment of the present use of agricultural resources and future possibilities in this field.
- B. Better assessment of agricultural characteristics that impede the development of particular types of agriculture and of others that accelerate this development.

- C. Based on a better understanding of the characteristics and achievements of the same or similar type of agriculture — a better definition of directions of its further development on a given area by introducing the positive aspects of these experiences and achievements.
- D. Based on a better understanding of the characteristics and achievements of other types of agriculture — a better definition of directions of its further development, by changing the present type of agriculture for another, more effective one.
- E. Better and more accurate definition of the ways and means of transition from the present to the future type of agriculture.

Even if only a fraction of these objectives are accomplished by the work of the Commission, the effort will be considered worthwhile. Started by the Commission, the international cooperation in the development of a common synthetic view on similarities and differentiation of world agriculture should be continued.

The typology of agriculture is to be based both on direct research and on the statistical and other data collected by various international and national institutions. Among them the FAO, having at its disposal a great amount of data from international censuses, as well as from the direct pilot and other studies, having a rich experience in compiling international information and statistical data, should be considered as the most important. Particularly the data from the future World Agricultural Census 1970, which for the first time will contain some questions on farm types, could be of great value for agricultural typology. At the same time, in order to avoid any unnecessary divergences, whenever possible and appropriate, the use of definitions and interpretations adopted by the FAO should be encouraged.

It is also believed that methods and techniques adopted for areal studies of agriculture and the resulting classifications

based on the experience of some dozens of experts could be of certain value to the FAO and to other international or national institutions interested in agricultural problems and development...

SCOPE AND CONTENT OF AGRICULTURAL TYPOLOGY

As to the scope and content of agricultural typology, the following conclusions may be drawn from the answers to the Questionnaire.

Although the term agriculture (agri-cultura), strictly speaking, means field cultivation and does not embrace livestock breeding, in agricultural typology it should be understood in its broader sense, accepted already in many countries, embracing both crop growing and all forms of livestock raising as well as the use of natural vegetation for feeding animals. The FAO programs of world censuses give detailed definition as to what should be included into the notion of agriculture. It remains, however, disputable whether some pre-agricultural forms of using biotic resources as primitive gathering, hunting and fishing should be included or not to the typology. There is also some hesitation as to whether such specialized forms of biotic resource use as forestry, fishing economy, etc. as well as various forms of collecting of forest, water, and other resources (berries, fungi, game, frogs, snails, etc.) combined or not with agricultural holdings are to be considered by agricultural typology.

There is no fully appropriate English term that would cover all agricultural activities in the sense given above. Thus, because of its more international character as reflected also in the FAO publications, it is suggested that the term agriculture is to be used in the official IGU languages (English and French); along with it the term farming in English and in other languages their traditionally accepted corresponding terms, could be applied as synonymous...

...When uniform principles, criteria and methods of approach are agreed upon and comparable measures and techniques adopted and checked by sample studies as to their universality, variations in importance, value, quality, availability of data and margins of errors, the aim of the Commission will surely not be the establishment of one more "quickie" scheme or classification but the initiation and promotion of a number of comparative regional studies distributed judiciously over the world. Those regional studies providing comparable, synthetic pictures of agricultural typology of particular areas would at the same time lay the foundations for the future uniform multi-order typology of world agriculture. On the other hand, when a more uniform approach to the principles of agricultural typology as well as a certain agreement as to its criteria and methods is reached, an attempt could be made to apply it in a preliminary way to classify world agriculture. Such a typological classification however preliminary it could be, might be of great help as a background for regional typological studies. It might be useful in clarifying certain common notions, in establishing common thresholds serving to distinguish particular types. It would deepen the awareness of global typifying features. It might test the universality of criteria. It might discover gaps in the material or methods, etc. etc. . . .

THE SUPREME NOTION IN AGRICULTURAL TYPOLOGY

In principle it makes no difference what term is to be applied as a supreme notion in agricultural typology. The problem is only to accept finally the same and clearly defined term which would be understood and applied in the same way by all those who are dealing with these problems. This call for reaching an agreement as to the term to be used.

Taking the results of the questionnaire as a basis, it is proposed that the term "type of agriculture" (respectively of farming) should be accepted as the supreme notion, rather than "system of agriculture" (or farming), not only because

the majority of the answerers have expressed themselves in favour of this notion, but also because of the very meaning of the term "system" which is commonly understood rather as a coordinated body of methods or an orderly way of getting things done; and by most of the answerers as concerning functional, organizational or technical aspects rather than all aspects of agriculture. It should also be noted that even some of those who are in favour of the term "system" as a supreme notion, ascribe to it organizational or technical, sometimes together with social, characteristics of agriculture rather than all of them. Hence the following expressions are often used by them: "system of land utilization," "system of cultivation," "système de culture," "cropping system," "crop rotation system," "système de parcellement," "system of stockrearing," "système d'élevage," or broader "system of farm management," "system of conducting farm economy," "system of farming," "agricultural system," "système agricole" but never or seldom only — "system of production," "système de production," "system of productivity", "system of commercialization", "system of specialization", etc.

In the light of the above, despite traditions existing in some countries, one should agree with those who consider that type and system should not be understood as synonymous, that the notion "type of agriculture" is broader, and if the term "system of agriculture" is to be applied despite possible confusion, it should rather be used as a synthesizing notion of all functional aspects of agriculture and understood as an ensemble of measures (or practices) and means aimed at the achievement of an agricultural production and at maintaining fertility of soil, not touching social and productive aspects of agriculture.

Since agriculture is one of the ways by which man utilizes Nature to satisfy his needs and in doing so organizes and transforms space, it is obvious that the type of agriculture, being a specific and concrete form of this utilization, cannot be conceived irrespective of a concrete portion of this space, i.e.

of the earth surface. Therefore, there seems to be no need to supplement the term „type of agriculture” with any additional adjective, as geographical or territorial, which could make a wrong impression that there may exist non-territorial types of agriculture, not connected with any area or territory, or that types of agriculture may differ not according to their essential characteristics but according to the discipline they are distinguished by.

Since, despite all differences in approach, both agricultural typology and agricultural geography have been founded and developed by the common effort of both agricultural economists and geographers, and further contribution of these disciplines as well as of some others (historians, anthropologists, ethnologists, sociologists, etc.) to the development of agricultural typology would be most significant, such division would be only harmful in realizing the objectives of the Commission

CRITERIA OF AGRICULTURAL TYPOLOGY

According to the opinions of most of the answerers and also according to the logic of every classification the “type of agriculture” should be defined on the basis of internal or inherent characteristics of agriculture. External characteristics, or rather conditions in which agriculture develops, however important they could be to explain “why and why exactly there” a particular type of agriculture has been developed, could not serve to define the types of agriculture.

What are, however, the external conditions of agriculture?

It is obvious that any particular type of agriculture is the result of an ensemble of social, technical, economic and cultural processes evolving in determined natural conditions, so that any type of agricultural does not develop in isolation but is associated with the natural, social, technical, economic and cultural environment of a given time and place.

These conditions, or environment include: general technical

level, general level of social and economic development, general level of civilization and culture, as well as such conditions of location as access to or distribution of transport lines, markets and centres of processing agricultural goods, governmental policies (subsidies, tariffs, etc.) reflected in prices and their relation to the prices of industrial goods, law regulations as to inheritance or division of holdings, degree and forms of cooperation between farms for sales of their produce and purchases of farm goods, terms of trade, etc., etc. . . .

Most of the criteria or internal characteristics, properties, attributes, or traits of agriculture proposed in the answers to the Questionnaire No. 1 could be classified in the three main categories those of social, organizational, and technical or economic nature, responding to three principal questions, viz. 1. who is a producer, 2. how produce is obtained, and 3. how much, what and what for is produced. Accordingly, these three categories should be considered as defining jointly the type of agriculture, and none of them could be omitted, unless it is proved that their uniformity on the area under study makes their use pointless.

It should be stressed, however, that although the classifications of agriculture based solely on one of these groups or one or several elements could by no means be considered as full typological classification, they are acceptable and often beneficial for the progress of agricultural geography and some of them for agricultural typology.

What is really aimed at the agricultural typology is a single, but multi-level classification, synthetizing social, functional (organizational-cum-technical) and production criteria. . . .

A. Social Characteristics

The social characteristics of agriculture are those which indicate who is a producer and what are his relations to the land and others working the land.

In much detailed classification, the legal status of agricultural holdings should be first considered whether one has to deal with common ownership (tribe, clan etc.), individual, cooperative, collective, governmental etc., then whether an agricultural holding is operated directly by an owner and, if rented, what is the form of tenancy (by fixed amount of money or produce, share-cropping or its equivalent in money, in exchange for services, rent free, on squatter basis etc.). Further the classification should reveal whether the operation of the farm is controlled by an individual or by a group, whether the labour is provided by the family only or with hired labour; permanent, temporary or occasional workers; and finally what is the role agriculture plays among the holder's occupation: whether one has to deal with full-time, part-time, spare-time holders, etc.

Different views have been expressed as to whether size of farm should be considered as social or rather organizational characteristic. It is obvious that in the size of farm both social status of a farmer and the scale of farm operation are reflected and the notion could be classified as both social and organizational. In both cases however, not so much physical size of the farm (measured in hectares or acres) but the economic one (measured in economic units) is more significant. Since the latter could be established only as a result of quite complicated calculations and requires the availability of the necessary data, it is not recommended to be used as one of the bases for agricultural typology except in its final stage or for some countries only. On the other hand, the use of conventional land units applied to compare relative importance of different land uses should be checked as to their value for typological studies.

In more generalized classifications, the share of particular forms of land holding (land tenure) affecting functional or production characteristics of agriculture, or the dominant forms (systems) of land holding (tenure) should be defined as characterizing the type of agriculture. It is felt that a special

study on the classification of world land tenure systems, which are particularly complicated in primitive agricultures, would be highly desirable.

From the methodic point of view, the study of social characteristics of agriculture does not present particular problems. Many of them, however, cannot be sufficiently well expressed in quantitative terms and should be supplemented by description. In any case, a system of most penetrating and comparable measures and indices that could encompass all forms of social characteristics of agriculture and would be best adapted to purposes of agricultural typology of various levels should be elaborated or adopted and tested.

B. The Functional (organizational and technical) characteristics of Agriculture

The functional characteristics of agriculture are those which respond to the question how the produce is obtained. They mostly deal with inputs of land, labour and capital (means of production); in other words, with measures, practices and means aimed at achieving agricultural produce and maintaining soil fertility. They could be divided into the three following groups:

1-0 organization of agricultural land, 2-0 measures and practices applied, 3-0 intensity of these measures and practices, i.e. intensity of agriculture.

The first group could include all the organizational characteristics measured in areal units as, for instance: farm land fragmentation, dispersion, size and shape of parcels, their enclosure and location as to the farmsteads, the division of agricultural land into main uses (arables or temporary crops, perennial crops, permanent grasslands) and then, according to the further destination for particular crops cultivation or harvesting.

The second group, the various technical practices contains

the use of human labour, animal and mechanical power and the proportions among them; the use of various agricultural tools and machinery for crop cultivation or harvesting; the ways or systems of soil, water, landform or climate management, such as crop or land rotation, manuring, fertilizing, irrigation, drainage, smoothing, terracing, contour ploughing, etc.; the methods of plant reproduction and selection, and methods of animal breeding including reproduction, selection, feeding, according to their species, breeds or productive types; the use of pesticides, herbicides and veterinary services; the annual or long-term disposition of work etc.

Many of these characteristics could be expressed in relatively simple measures such as the proportion of land used for various purposes, or practices applied on it or else a number of particular means or tools per unit area, or percentage proportions between them.

In some cases, the ways, tools, or practices could be reduced to comparable units or measures, such as conventional units of land, power units, conventional units of manure, big animal units, etc.

What presents a real difficulty is rather the great number and variability of various organizational and technical characteristics some of which are connected with particular crops or animals only, with particular agricultures, or have a clearly local character. At the same time a number of characteristics or their relations cannot be expressed in quantitative terms and should be presented only by description.

This situation has resulted in the development of a number of more or less synthetic notions that could be used particularly in macro-typological investigations.

The following notions could be mentioned here:

1. systems of field pattern, fragmentation and dispersion connected with the type of rural settlements as to the degree of their dispersion or nucleation;
2. systems of land cultivation (by hoe, plough, with or

without using animal power, with or without using mechanical power, uniform or interplanted);

3. systems of land or crop rotation (land rotation, crop rotation with or without fallow land, irregular, regular, free, none; two, three or more-year, etc., etc.);

4. systems of irrigation (gravity flow, pumping from open waters, pumping from ground waters, sprinkling, etc.);

5. system of livestock breeding (nomadic herding, transhumance, open grazing, enclosed grazing, chain grazing, stable keeping, etc.);

6. land use or crop combination systems — based on the division of land among major uses or particular land uses among leading crops.

All the above mentioned classifications should be tested as to their bases, universality, etc., and then adjusted or adapted to the purposes of agricultural typology.

At the same time, a system of most pertinent, comparable measures and indices that would characterize the most important organizational and technical characteristics of agriculture should be elaborated and adopted for agricultural typology of various orders.

The situation is different as regards the third group of functional characteristics: namely the intensity of agriculture. As answers to the Commission Questionnaires show, intensity of agriculture is often identified with productivity or else defined on the basis of productivity. Both approaches that have developed since a long time seem to be erroneous.

In the first case, the use of two different terms for the same notion or one term for two different notions is confusing. In the second — the definition of intensity based on productivity is wrong since production only to some extent depends on labour and capital (means of production) inputs, but also on natural conditions of particular area. In fact, agricultures considerably differ from each other as to the degree on which the productivity in a given area depends on inputs, on the one hand, and on natural properties of soils, climate,

water, etc., on the other hand. Accordingly, one may distinguish land, labour and capital oriented agricultures in which production is obtained with a minimum input of labour and/or capital in the first case; through heavy inputs of labour with a minimum capital in the second case, and the dominant capital inputs in the third case.

The first, land oriented agriculture is usually called extensive agriculture, the second and the third are considered as intensive, labour and/or capital absorbing agricultures.

Most of the answers properly understand intensity of agriculture as the intensity of means and practices applied, or in other words, as the amount of labour and capital (means of production) inputs per unit area. It leads to discerning labour intensity from capital (means of production) intensity.

Labour intensity is relatively easy to define. It may be expressed with greater precision, as man/hour or man/day ratios of labour to land, or with less precision by the number of people employed in agriculture per unit area. The capital (means of production) intensity could be defined only for basic units and only there where bookkeeping of farm accounts is carried on and could be expressed in monetary units only, the deficiency of which in areal studies will be discussed below. As a result, the total intensity and the proportion between labour and capital (means of production) inputs (fixed and floating assets) could only be determined in the typology of the lowest order and only in some countries. This would require a great amount of research work that would make it impossible to cover more extensive area.

This is the reason why a number of indirect methods of measuring intensity have been tried, particularly in the macro-scale studies.

Among them the method of symptoms of intensity, measuring the role of more labour and capital absorbing elements in agriculture has appeared in some studies. For instance, the share of cultivated land in the total agricultural acreage, the share of sown land in the total arable land, the share of per-

manent crops in the total agricultural land, the share of intensive crops in the total sown land, the role of intensive livestock breeding, etc., etc., are taken as symptoms of intensity. It is obvious that this method, because of its very general and relative character, could be used in preliminary investigations only and does not give any idea of total intensity.

Another method is based on expressing particular elements of agriculture (crops, kind of animals) by a certain number of points (scores) reflecting their labour and capital intensity. The sum of these points is assumed to express the total intensity. Since, however, the intensity of cultivation of the same crops or rearing of the same animals may be different and the number of scores representing them is not based on comparable and objective enough criteria, the method should be considered as giving rather subjective, inaccurate and relative results.

The third method is that of selected indices of intensity. Various indices are used to define intensity, as, for instance, the value of means of production (capital inputs) per unit area, the value of fixed and floating assets per unit area, the labour input per unit area. These indices similarly to those used by the direct methods, can only be applied in some countries with more developed or large-scale agriculture. Otherwise simpler but less precise indices are used, as the density of people employed in agriculture or even of agricultural population per unit area, the number of draught animals per unit area, the number of tractors per unit area or the extent of tractor cultivation, the number of engines per unit area, the amount of farmyard manure or the number of animals in conventional manurial units, the amount of inorganic fertilizers per unit area, etc. etc.

This method, however accurately it may reflect particular inputs by means of individual indices, does not give any idea of the total intensity and the proportions between its main components, since the particular indices are not comparable and cannot be summed up.

It results from the above that until now there is no proper method which could be recommended to measure accurately both intensity and its components except the direct method based on inquiring each holding separately, a method which could hardly be applied in areal studies.

Since, however, the intensity of agriculture seems to be a very important typological criterion, the elaboration of methods of measuring the degree and structure of intensity possible to be applied in agricultural typology of various orders would be most desirable.

Until this is done, the best of the existing and applicable methods of measuring partial intensities should be selected, checked and adjusted to agricultural typology of various orders.

C. Production characteristics

Production characteristics are those which respond to the question of how much, what and what for is produced, i.e. what are the effects of production and what is their disposal.

The elementary effects of production are expressed by yields of various crops, that of milk, meat and other animal products, production of permanent grasslands, etc. These elementary characteristics measured in various natural units cannot be compared with each other, combined or summed up, in order to provide more aggregate characteristics of agriculture such as productivity, commercialization, production orientation or specialization.

To define them either monetary units or various, conventional units based on natural properties of particular agricultural products are applied.

Of these indices the monetary units are most frequently used. They are the clearest and most understandable to all, and are easy to manage. However, when applied in areal studies of agriculture, they bring results that are hardly comparable both in time and space. This is due to the fact that their

use is based inevitably on prices of agricultural goods, which undergo constant changes in time and vary greatly in space. Owing to various governmental policies, agricultural prices seldom express a free interplay of demand and supply and thus differ widely in particular countries and even in particular regions. In some countries there are several different prices for the same agricultural goods. Finally, for products not destined to the market, particularly in subsistence or semi-subsistence agricultures, any price seems to be irrelevant.

To overcome these difficulties a number of conventional units have been elaborated and applied in various countries. Some of them are based on labour inputs required to produce a certain amount of crops or animal products. For studies of small countries or regions with more or less uniform level of agricultural technique these units might represent the real value. For any comparison on a larger scale and particularly on a world scale, the use of conventional units based on labour inputs could greatly distort the results, as the labour inputs required to produce the same amount of the same crops vary greatly depending on the technical level of agriculture (the use of various agricultural tools, machinery etc.) and to a lesser extent on the natural conditions in which farmers operate (soils, landforms etc.).

The most popular of the conventional units at least in European countries are the so-called grain units based on the protein and starch content in particular agricultural products. Their deficiency, however, consists in that products which are not meant for protein or starch as e.g. fiber crops, wool, tobacco or even such food crops as fruits, hardly could be expressed in these units. Although the useability of grain units has been extended by some scholars on almost all agricultural products, basing on input-output comparisons, yet the evaluation of these products in grain units remains disputable. Several criticisms have also been made, that for example animal production, when evaluated in terms of grain units based on the amount of fodder used, is underestimated. The use of

grain units precludes any further investigations in a whole sphere of such economic or financial problems, which can be expressed in monetary units only, as capital input, income, revenues, capital efficiency or profitability, etc. etc. On the other hand, the use of grain or other conventional units, as independent of price fluctuations, assures full comparability, both in time and in space, of the results obtained which is particularly important in typological studies.

Since all units of aggregate production, when used in areal studies, present certain advantages and deficiencies a special study would be required to compare the applicability, value and feasibility of using all those measures in typological studies to decide which one of them, or, in some particular cases, more than one, should be chosen to measure agricultural production.

Another methodical problem is what production is to be used as a basis to define the production characteristics of agriculture: gross production, i.e. total directly obtained agricultural output or final production, i.e. gross output less the products utilized within agricultural unit for production purposes as fodder, litter, seeds, green manures, etc. Taking gross production as a basis one should be aware of the fact that some elements of production might be counted twice (e.g. feeds counted once in crop production and for the second time as submerged in animal production) and thus overestimated both their role in the total agricultural production and the total crop production in comparison with animal production. At the same time certain labour and capital inputs are made both when the fodder, seeds or green manures are produced, and when they are used. Thus when estimating labour or capital productivity they should not be dropped out from the account. Another question is that despite difficulties in assessing some of the minor components of gross production for which statistical data are usually lacking (straw, manure, etc.) even in the countries having rich and reliable statistics, it is still more difficult in areal studies other than those of basic units, to

split the production of each particular crop according to its various destinations (internal use for reproductive purposes, for home consumption, etc.).

Yet the final destination must be known if final production is to be accurately defined. Taking into account all these circumstances most of the answerers tend to conclude that although final production would better serve the purpose, gross production, being more obtainable, should be accepted at least in the macro-scale typological studies. However, whenever possible, both gross and final production should be estimated. In most agricultures, where the bulk of fodder crops produced is used on the farm and where the seeds are also produced on place, final production could be approximately assessed by merely subtracting fodder crops and those required for seeds from gross production. In many cases the structure of final production does not differ much from that of commercial production.

Even in countries having detailed and reliable statistics, data on some element of gross or final production are lacking and their evaluation should be based on estimates. In general, however, these elements are of minor importance and any possible error in their evaluation does not affect much the final result.

The situation is different in those countries where the evaluation of total (gross or final) agricultural production is to be based wholly or largely on estimates. Since agricultural production is the basis for such important typological characteristics as agricultural productivity, degree of commercialization, and production orientation, every effort should be made in any typological study to evaluate, at least approximately, the total agricultural production of the unit studied.

(1) Productivity of agriculture. One could distinguish elementary productivity, i.e. yields of particular crops or animal products per unit area or per head of productive animals (milking capacity, egg laying capacity, meat production in live weight, etc.); branch productivity, i.e. field productivity, pro-

ductivity of perennial crops (usually per 1 producing tree), grassland productivity; total crop (vegetal, plant) productivity, as well as total animal productivity per unit area, per animal head or per one conventional animal unit; and, finally, aggregate total productivity, i.e. total gross (or final) output per unit area of agricultural land, i.e. land productivity; total gross output per one employed person, i.e. labour productivity or labour efficiency; and per unit of capital (means of production), i.e. capital productivity or capital efficiency.

In some countries where there is a great disparity between the productivity of particular agricultural land uses (e.g. intensively cultivated fields and perennial crops, on the one hand, and extensively used rough pastures, on the other) it is disputable whether land productivity is to be estimated per unit of total agricultural land or per unit of cultivated land only, or both, or else per any conventional unit of land.

As land productivity is considered one of the most essential production characteristics of agriculture, attempts should be made to define it on all levels of typological investigation. It is obvious that in typological studies of the highest order or concerning areas where agricultural data are lacking, it could mostly be based on estimates, sample studies or interviews, supplemented with a sound knowledge of the given area. Yet, agricultural productivity varies so greatly in time and space, that even the definition of its range would be of great value for agricultural typology.

Labour productivity (= labour efficiency) is another very important typological feature, which distinguishes the extensive types of agriculture from the intensive, labour absorbing ones. Here the use of final production as a basis instead of gross production seems to be wrong for reasons stated above. As to the labour units — working hours or days with separate coefficients for male, female, youngsters and old people work could be applied in detailed typological studies of a lower order, while in more general studies an index of agricultural output per one person employed or even per head of agricul-

tural population might be sufficient, despite some possible inaccuracies resulting from the fact that some manpower could not be fully utilized, forming labour surpluses.

In any case, one should attempt to determine more or less precisely labour productivity in every typological study of any order.

As to the capital (means of production) productivity (= capital efficiency) its definition is more difficult for the same reasons as capital intensity. To define it, data are required as to capital inputs (fixed and/or floating assets) which is available only in some countries and in the studies of basic units; there is no other common measure to estimate capital inputs and efficiency except that of monetary units; the deficiency of their use has been already explained.

(2) Commercialization of agriculture. Almost all the answerers acknowledge the importance for agricultural typology of defining the destination of agricultural products; for domestic consumption or for sale: in other words, whether and to what degree one has to deal with commercial or subsistence agriculture.

The estimation of commercial production is easier in developing countries than that of gross or final production, since the only statistical data available there are often those on commercial production, usually separated from subsistence production.

Also for large-scale farming both in the capitalist and socialist countries, commercial production could easily be established. On the contrary, it is difficult to estimate it in small-scale peasant farming, partly commercial, partly subsistence, where sales are sporadic, go different ways and corresponding data are either scattered or not available at all.

To define commercialization characteristics three complementary measures could be used: 1-o, the ratio of commercial production to total (gross or final) production, i.e. the degree of commercialization; and 2-o, the amount of commercial production per unit area of agricultural land, which may be

called level of commercialization or land commercialization; and 3-0, the amount of commercial production per 1 employed which may be called labour commercialization.

The first of these three measures is the most important for agricultural typology and should be recommended for typological investigations of all orders. The two other seem to be of less importance and their value for typological studies should be tested.

The degree of commercialization is measured as a percentage of total (gross or final) production. The two other measures as independent ones could be expressed either in monetary or conventional units.

Of course for purely subsistence agricultural all these measures will be null.

In any case a system of corresponding measures and indices best depicting the differences between commercial, subsistence and various transitory forms of agriculture should be elaborated and adopted.

(3) Orientation of agricultural production (agricultural orientation).

From the answers to both questionnaires it could be concluded that the term "orientation" in the sense of emphasis on certain crops and animal products that has been suggested in the Commission questionnaires is not clear enough, at least for the English speaking answerers, who often tend to understand it as market versus non-market orientation of particular agricultures. On the other hand the term is established or widely used in the other languages. The question arises whether, in the English text, it should not be substituted by another term (such as combination or association of particular farm enterprises or products, composition of agricultural production, emphasis on particular enterprises or products or any other that would be acceptable and would not lead to the confusion) or shall the Commission proceed using the term "orientation" in the aforementioned sense in the hope that it

would be finally accepted. The answer should be given first of all by those answerers whose native language is English.

Whatever term would be finally accepted in English, the notion as such has been considered by most of the answerers as being of importance for agricultural typology. On the other hand, a number of the answerers have expressed their feeling that the notion of specialization is to be connected with commercial agriculture rather than with every kind of agriculture. Following this way of thinking it is suggested that the term "orientation of agriculture" or other accepted notions should be used in connection with total (gross or final) production; and specialization of agriculture only in connection with commercial production.

In highly specialized agriculture where production is limited to a few products, agricultural orientation could be defined on the basis of its dominant elements grouped at the most in either crop (vegetal, plant) or animal products; in mixed farming, however, where numerous products are obtained, a number of them being similar or complementary as to their kind, use, or destination, the definition of orientation is more complicated and requires some grouping of those products. There are numerous grouping systems being in use in various countries, but for comparative reasons only one, the most versatile and universal system should be adopted to define orientations. It is suggested that the grouping of crop or animal products in defining orientation of agricultural production should be made from the point of view of what kind of product is obtained or what it is used for, rather than according to their agronomic properties (requirements as to the natural conditions, position in crop rotation) or destination (used on farm or sold).

Since orientation of agricultural production (or whatever other name will be accepted) is one of the most important typological characteristics, its definition should be recommended for the typological studies of any order.

The only difficulty is that, similarly as in the total production, the necessary statistical data concerning its components are available for basic units, and only in some countries, particularly countries with large-scale agriculture. In the macro-scale studies, particularly for small-scale peasant farming, even in the countries having detailed and reliable statistics, the definition of orientation would require some estimates. In the countries where statistical data are highly incomplete or entirely lacking, the definition of both total production and its components must almost entirely be based on estimates resulting from observation, sample studies, etc. Having no accurate data as to the yields of crops or productivity of animals, those estimates could be based on data on the surfaces cropped, number of animals etc., multiplied by the productivity indices evaluated on the ground of average yields of crops or animal output in the given area.

Such estimates would surely give an only approximate idea, but usually sufficient for comparative purposes, as to the proportions first between crop and animal production and then between the dominant branches or enterprises within those two main divisions of agricultural production...

For comparative reasons, however, a uniform method of defining the orientation of agricultural production should be established or adopted. It should be relatively simple and easy to manage in typological studies of any order.

(4) Specialization of agriculture. The term "specialization" of agriculture seems to be understood in two different ways. While some answerers support the idea originally suggested by the Commission that specialization should be understood as an emphasis in the production (or sale) of particular (cash) crops and/or animal products (for sale), others seem to understand it rather as a degree in which agriculture is specialized.

It seems that both notions are of value for agricultural typology. They should be singled out as follows: (1) the degree of specialization i.e. the degree commercialization of agriculture is dependent upon one, two or more leading crops or

animal products. This index could be established accurately using proper mathematical methods. In this sense one can speak about a high or narrow specialization when one or few leading products are involved and about low specialization when commercial production consists of many products; (2) the orientation of (in) commercial production (in specialization) is defined in more or less the same way as orientation (combination etc., see above) of agricultural production; however commercial production instead of total (gross or final) agricultural production is used as a basis. In the case of a highly commercialized and specialized agriculture the orientation of specialization of agriculture would be close to agricultural orientation. In most cases, however, and particularly in the mixed, only partly commercial and partly subsistence agricultures — and such are most widespread — the differences in composition of total and commercial production are quite impressive. Indeed, they increase with the decreasing role of commercial production. Obviously in purely subsistence agriculture specialization completely defies definition.

Since the number of components of commercial production is usually smaller than that of gross production it remains disputable whether any grouping of these components is necessary, or an analogous or different grouping is to be introduced.

Since it is usually easier to obtain data on commercial production than on total production, it is easier to define specialization rather than orientation of agricultural production in most cases, however, the margin between total production and its commercial part is quite extensive; consequently the definition of orientation as well as that of productivity should not be replaced by specialization or by the level of commercialization.

In any case a uniform method of defining specialization of commercial production should be established, tested and adopted for typological studies of various orders.

THE COMBINATION OR INTEGRATION OF TYPOLOGICAL CHARACTERISTICS

Typological procedure involves the attainment of a number of indices, which characterize various aspects of a given type of agriculture. The number of those indices could vary according to the level of investigation: for comparative reasons, however, a minimum set of indices should be established characterizing any possible type of agriculture of any order.

It is too early to establish a final and a universal set of indices. Based on the up-to-date experience in typological studies, the answers to both questionnaires and the discussion on the 2nd meeting of the Commission, the following list of agricultural characteristics to be used on three various levels of investigation has been prepared as provisional to be checked by further regional and topical studies (see Table).

The list contains three groups of characteristics namely social, technical-cum-organizational and productional. According to the level of investigation each group is expressed by a number of different measures and indices. The lowest level of investigations based on direct studies of properties of agricultural holdings contains the greatest number of these measures that could fit various detailed studies on various parts of the globe. While some measures or indices listed could be proved not indispensable for arriving at a typology, it is almost certain that some other characterizing agricultures of non-European countries are still lacking and should be supplemented by regional testing studies.

The proposed measures and indices to be used in the investigations on the world types of agriculture (the highest level), while much less numerous, are perhaps still too many. They also should be checked as to their importance, universality and possibility to be used for that order of studies.

Between these two levels the third one of transitory character has been proposed for the studies of regional or national scale. This level of investigation would be based on aggregate

data characterizing agriculture by administrative or other units of various size, checked or not by sample studies of individual holdings. Such studies could be carried out at several levels and would probably require more than one set of measures and indices, ranging from more detailed studies based on units of, say, communes, townships or parishes to those of countries, departments or provinces. Now, however, having no sufficient experience, one set of measures and indices has been proposed for all "meso-scale" studies much less numerous than that proposed for the studies of the lowest order, but richer than that for the studies of highest order for world types of agriculture.

To assure sufficient comparability not only of the studies of various areas but also of various orders all these three sets of measures and indices have been arranged in such a way that the lower level contains usually the measures and indices suggested for higher levels of investigations. Of course the less detailed study of a given order could also use the measures and indices proposed for the higher order of investigation being aware that this would be only of preliminary, sketchy character, very often, however, sufficient to get a general knowledge of agricultural types of a particular area.

All these sets of measures and indices should be tested as to their importance, applicability and relevance by as many studies on various parts of the globe as possible.

Once, however, a final list of characteristics and measures is accepted, every effort should be made to apply all of them as a minimum in agricultural typology. Only when some of these characteristics are found of negligible or no importance in a given area or when that area is found uniform with regard to some of them, could they be omitted in a particular study. In any case an appropriate statement should be made.

The definition of a certain number of typological characteristics does not yet solve the problem of agricultural typology. The question arises: how can one having more or less numerous indices characterizing various aspects of agriculture in a given

area combine them in such a way as to arrive at an accurate definition of types of agriculture as a synthetizing notion.

There are several kinds of methods of combining or synthetizing the areal phenomena.

1. As even a minimum list of measurable and non-measurable attributes accepted to characterize any type of agriculture would contain at least a dozen items, their simple cross tabulation would yield an almost astronomic number of possible combinations. Although a great number of those combinations possibly do not exist in reality, the method is still doubtful as to feasibility of its use in agricultural typology.

2. Another method is that of superimposing the mapped picture of the areal range of particular phenomena. The method, although sometimes being still in use, is known as rather intuitive, and yielding no quantitative, measurable results.

3. Next comes the method of ascribing a weight expressed in a certain number of points (scores) to the particular characteristics. The sum thus obtained and its composition gives a quasi-synthesis of phenomena under investigation. Although the results are expressed in quantitative terms the method cannot be considered an accurate and objective one, since the weighing of elements is based not on their reduction to common measures, but usually on the extent they are differentiated or dispersed. As a result, un-summable elements are often summed up and used to draw conclusions.

4. Another group consists of various graphic methods, such as double axial or triangular graphs. These methods, however accurate, are out of the question when too many variables are being considered, unless a separate graph is traced for each unit. In this case the problem arises of accurate comparing of the particular graphs.

5. Yet another method is that in which model types, characterized by a number of measurable and non-measurable properties, are established. All cases (agricultural holdings, areal units) with certain minimum number of deviations are

grouped together to form the model types. Further cases are compared to these model types and deviations are examined. The cases with a number of deviations ranging beyond certain accepted threshold are expected to form different types whenever deviations are of the same character. To facilitate the comparisons the agricultural characteristics both of the model types and those of the particular cases should be presented in a formalized way (formulas).

The method yields relatively accurate results, particularly when numerous non-measurable characteristics are involved. It might be combined with the graphic methods as well.

6. The sixth group of methods could be called geometric methods. In this group the similarities and differences between various phenomena are expressed in distances. Various methods could be classed to this group as for instance, the methods of average differences, similarities, or affinities, that of maximum homogeneity, nearest neighbour analysis, dendrite, linkage tree, etc.

The above methods yield sufficiently accurate, quantitative results. However, they usually require that every unit is compared with all the remaining ones, which makes them very labour absorbing. If many units and many characteristics are involved, the use of computers is necessary. It is also disputable whether characteristics expressed in different measures could be compared via these methods.

7. In the last few years a number of mathematical methods of combination, aggregation and integration of different characteristics have been elaborated and applied in various scientific disciplines. All of them require much calculation, which is facilitated now by the growing use of computers. The possibility of application and efficiency of using some of them, such as the multi-factor or latent structure analyses in agricultural typology, should be tested.

It is felt that special study testing and comparing various methods and techniques of combining agricultural characteristics as to their use for agricultural typology would

be of great importance. The method that would be finally accepted should allow also cartographic presentation. The technique of such a cartographic presentation should be carefully elaborated and tested with the number of examples.

In any case the last stage of agricultural typology of any order, i.e. the synthetizing of various typological characteristics, even though some of them may be based on estimates rather than on accurate data, should not be made intuitively. Quantitative methods should be used as much as possible to provide measurable and thus comparable results. Nevertheless, additional description explaining characteristics of a given type that cannot be expressed by quantitative values, as well as analyzing natural and other external conditions in which a given type of agriculture has come into being and developed, would always be desirable...

CONCLUSION

As one could see from the above, the problem is important not only for the future development of agricultural geography as a scientific discipline and for acquiring a better, more synthetic knowledge of world agriculture, its past development and its present areal pattern, but also for better solving some practical problems of areal development. But the task is heavy and difficult and could be solved only by the common effort of many.

Since still everything from principles and criteria to methods and techniques of agricultural typology could be changed or improved, all comments, remarks and criticisms as to the present report and the proposals of change are greatly welcomed.

As the proposed criteria, methods and techniques should be tested as to their relevance, applicability, feasibility, universality, etc. by as many as possible sample studies of different order, every study of this kind from every continent, country or region is highly welcomed and encouraged.

As there are still several unsolved problems, a number of topical or methodical studies are desirable and welcome as well, such as: the classification of land holding (land tenure) systems, livestock breeding systems etc., methods of estimating and measuring agricultural intensity, testing of measures of agricultural production, methods and techniques of combining (integrating) agricultural characteristics etc. etc.

May we end this report, closing the first stage of the Commission work, by inviting everybody interested in areal problems of agriculture to join the IGU Commission for Agricultural Typology in the common effort to establish principles, criteria, methods and techniques of agricultural typology, in testing them through sample studies of various orders and in working out the agricultural typology on a World, regional and national scale.

AGRICULTURAL CHARACTERISTICS
to be considered in agricultural typology

Groups of characteristics	Sub-characteristics of lower order (national or lower scale) recommended for micro-scale studies based on data on agricultural holdings as basic units	Sub-characteristics of higher order (regional or national scale) recommended for meso-scale studies based on aggregate data for units of lower order, checked or not by sample studies of agricultural holdings	Principal or highest order characteristics (World scale) recommended for macro-scale studies based on aggregate data for units of higher order
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// — if locally important

* — if necessary data are available

I. SOCIAL CHARACTERISTICS

1. land (water, tree, herd) ownership	— form of ownership: common (tribal), individual, group (corporation, cooperative, collective), state owned — law of inheritance	— percentage share of particular forms of ownership and operation combined with size of holdings: a. common (tribal ownership and operation b. individual ownership and operation (family operated without or with hired labour, hired labour dominant, etc.) c. separate ownership and operation (large scale ownership — small scale operation; small scale ownership — large scale operation) by forms of tenancy d. group ownership — individual operation by forms of tenancy e. individual ownership — group operation by forms of tenancy f. group ownership and operation: (cooperation, cooperative, collective, state) a combined index giving the percentage of agricultural land and percentage of farm units (thresholds to be established)	— dominant forms of ownership and operation: a. common (tribal) ownership and operation b. individual: owner operated, tenant operated, hired labour operated c. group operated: corporation, cooperative, collective, state by size groups of holdings (thresholds to be established)
2. operation (decision making)	— form of operation: common (tribal), individual owner, individual tenant, group (corporation, cooperative, collective, state) operated — form of tenancy: free use without obligation, share cropping, fixed rent etc., with or without use of means of production owned by land owner/		
3. labour supply	— forms of labour supply: family, hired occasional /seasonal/, permanent workers and share of particular forms in the total amount of labour inputs		
4. size of holdings	— total area in physical and/or conventional units		
5. degree of employment in agriculture	— percentage amount of time in (or off) holding (full time, part time, spare time), kind of additional employment/		

II. ORGANIZATIONAL AND TECHNICAL (= FUNCTIONAL) CHARACTERISTICS**A. ORGANIZATION OF AGRICULTURAL LAND**

1. site of land holding, its fragmentation and pattern of fields	— number and kind of parcels (lots) by main land uses/ — average distance between parcels (degree of dispersion)/ — average distance from parcels to a farmstead/ — sizes and shapes of parcels (degree of compactness)/ — field enclosures: density, length, kind etc./	— degree of fragmentation of agricultural holdings (average number of parcels per one holding)/ — percentage of land with enclosures/ — percentage share of main land uses	
2. land utilization	— percentage share of particular main land uses (agricultural, forest, water, built up, idle, mixed etc.) in total land acreage — percentage share of particular agricultural land uses (arable, perennial crops, permanent grassland, mixed) — system of land utilization (= land use orientation or combination) — arable land crop combination (orientation of arable land utilization) — perennial crop combination (orientation of perennial crop land utilization) — permanent grassland types (types of vegetation cover)	— percentage share of agricultural land uses — system of land utilization — arable land crop combination — perennial crop combination/ — permanent grassland types/	— system of land utilization — crop combination

B. MEASURES, PRACTICES AND TECHNIQUES APPLIED

1. management of natural conditions			
a. land form management	— smoothing, terracing: percentage share of particular land uses under smoothing or terracing; systems applied/	— percentage of particular land uses under terracing/	— percentage of land under terracing/
b. water management	— irrigation: percentage share of particular land uses under irrigation, systems applied/ — drainage: percentage share of particular land uses under drainage; systems applied/	— percentage of particular land uses under irrigation/ — percentage of particular land uses under drainage/	— percentage of land under irrigation/ — percentage of land under drainage/
c. climatic management	— extent and techniques of climatic management: wind-breaks, hotbeds, greenhouses etc./		
d. soil management	— soil fertilization: amount of particular kinds of manure and fertilizers (green manure, stable manure, various chemicals) per unit area of particular land uses and crops — degree of soil fertilization in conventional manurial units per unit area; proportion between natural and chemical fertilizers applied — technique of soil cultivation: by digging stick, hoe, araire, ard, wooden plough, tractor drawn sets of implements; proportion of their use	— amount of stable manure and fertilizers in physical units per unit area of particular land uses and crops — degree of soil fertilization in conventional manurial units per unit area; proportion between natural and chemical fertilizers applied — percentage of land cultivated with the use of particular implements	— dominant methods of soil fertilization — degree of soil fertilization — dominant implements of soil cultivation
e. biologic control	— extent and techniques of combatting weeds, pests, diseases etc. (use of herbicides, pesticides etc)/		

<p>2. systems of crop growing</p>	<p>— land/crop rotation: number of years, succession of crops, aftercrops, intercultivation, multicropping (number of harvests per year, succession), mixed use; techniques of crop harvesting</p> <p>— rate of harvested land to cultivated (arable, rotated crop) land</p> <p>— perennial crop cultivation system: uniform orchards, groves or plantations; mixed interrow, intercalary etc. cultivation; techniques of harvesting</p> <p>— permanent grassland use systems: grazing and its systems, mowing for hay (how many times a year), alternate grazing and mowing, mixed use (with arable or perennial crops with forest etc.— percentage of grassland overgrown with trees or shrubs), techniques of harvesting — ways of plant reproduction and selection</p>	<p>— percentage share of particular land and/or crop rotation systems, intercultivation, multicropping etc.</p> <p>— rate of harvested land to cultivated land</p> <p>— particular perennial crop cultivation systems in percentage share</p> <p>— permanent grassland use systems</p>	<p>— dominant systems of land and/or crop rotation: land rotation; crop rotation with long fallow, with short fallow; continued rotation — irregular, regular, short (less than 5 years) long (5 years or more); multicropping; perennial cropping — uniform or intercultivated; permanent grassland — grazed or mowed</p>
<p>3. methods and techniques of livestock breeding</p>	<p>— organization of forage basis (percentage of dependence upon own forages: permanent grasslands, fodder crops, etc. and acquired from outside</p> <p>— composition, age structure and herd rotation of productive livestock according to species, breeds and productive types (dairy or beef cattle, egg or meat poultry etc.)</p> <p>— systems of livestock breeding: nomadic herding, transhumance, open range grazing, enclosed grazing, mixed grazing and stable feeding etc.— classification to be established</p> <p>— amount and percentage composition of livestock in conventional units per unit area of agricultural land (and fodder basis land unit)</p>	<p>— percentage dependence upon permanent grasslands, fodder crops or forages acquired from outside</p> <p>— composition and age structure or productive livestock according to species and productive types of animals</p> <p>— systems of livestock breeding</p> <p>— amount and percentage composition of livestock in conventional units per unit area of agricultural land</p>	<p>— dominant productive animals</p> <p>— systems of livestock breeding</p> <p>— density of total livestock in conventional units</p>

C. INTENSITY OF AGRICULTURE

<p>1. Labour, animal and mechanical power inputs</p>	<p>— amount of labour available (age and sex structure)</p> <p>— amount of labour inputs in man/hours or man/days per unit area of particular land uses and crops and per total agricultural acreage (or cultivated land)</p> <p>— rate of labour used to labour available in conventional unit of labour</p> <p>— amount of animal power used per particular land uses and crops and per total agricultural acreage (or cultivated land)</p> <p>— percentage share of particular kinds of work animals in the total amount of animal power (in conventional units)</p> <p>— amount of inanimate (mechanical) power used per particular land uses, per crops and per total agricultural acreage (or cultivated land)</p> <p>— total amount of power (human, animal and mechanical) in conventional units per unit of particular land uses and crops and per total agricultural acreage (or cultivated land); percentage proportion between these three groups of inputs</p> <p>— percentage degree of mechanization of particular field and other agricultural works/</p> <p>— degree of mechanization of agricultural activities/</p> <p>— educational level of farmers/</p> <p>— yearly rhythm of labour disposal</p>	<p>— density of agricultural population per unit of agricultural land</p> <p>— density of employed in agriculture per unit of agricultural land</p> <p>— degree of agricultural overpopulation or labour shortage/</p> <p>— density of work animals (in conventional units) per unit area of cultivated land</p> <p>— percentage share of particular kinds of work animals in the total amount of animal power (in conventional units)</p> <p>— density of mechanical power (in conventional HP units) per unit of agricultural acreage (or cultivated land)</p> <p>— total amount of power inputs per total agricultural (or cultivated) land, percentage proportion between these three groups</p> <p>— percentage degree of mechanization of principal works/</p> <p>— degree of mechanization of agricultural activities/</p> <p>— percentage rate of educational level of farmers/</p>	<p>— density of agricultural population (and of employed in agriculture)</p> <p>— density of work animals (in conventional units) per unit area of cultivated land</p> <p>— dominant kinds of work animals</p> <p>— density of mechanical power per unit of agricultural land/</p> <p>— dominant categories of power used</p>
<p>2. aggregate intensity of agriculture</p>	<p>— *amount of labour and capital inputs (value of fixed and floating assets) per unit area of particular land uses and crops and per total agricultural acreage</p> <p>— *proportion between labour and capital inputs</p> <p>— *percentage share of industrial products (amortization of machinery, irrigation and drainage implements, value of chemicals used etc.) in total inputs (prime costs of agricultural produce)</p> <p>— intensity estimated in terms of symptoms, coefficients or selected indices of intensity or other methods (to be tested)</p>	<p>— to be tested what is possible and expedient</p>	<p>— to be tested what is possible and expedient</p>

III. PRODUCTION CHARACTERISTICS

A. AGRICULTURAL PRODUCTIVITY

<p>1. land productivity</p>	<ul style="list-style-type: none"> — productivity of particular crops: yields per unit area or per tree — arable crop productivity (in conventional or monetary units) per unit of arable land — perennial crop productivity (in conventional or monetary units) per unit area under perennial crops — permanent grassland productivity (in physical, monetary or conventional fodder or other units) per unit area — productivity of particular animals per head (milk, live weight, wool, eggs etc.) — animal productivity in total and by branches (in conventional or monetary units) per unit area of total acreage or fodder basis unit only — total final production (in conventional or monetary units per unit area of agriculture (or conventional) land — total gross production (in conventional or monetary units) per unit area of agricultural (or conventional) land 	<ul style="list-style-type: none"> — average yields of main crops — average productivity of principal animals — land productivity i.e. gross and/or *final production per unit of agricultural (or conventional) land 	<ul style="list-style-type: none"> — dominant land productivity (gross production per unit of agricultural land): very high, high, medium, low, very low (thresholds to be established)
<p>2. labour productivity</p>	<ul style="list-style-type: none"> — volume of particular products per unit of labour input used for their production — total crop production in conventional or monetary units per number of employed in crop growing — total animal production in conventional or monetary units per number of employed in livestock breeding — total final production per one employed in agriculture — total gross production per one employed in agriculture 	<ul style="list-style-type: none"> — labour productivity i.e. gross production per one employed in agriculture 	<ul style="list-style-type: none"> — dominant labour productivity (gross production per one employed in agriculture): very high, high, medium, low, very low (thresholds to be established)
<p>3. capital productivity</p>	<ul style="list-style-type: none"> — *value of particular crops and animal products per unit of capital inputs used for their production — *value of crop production per unit of capital inputs used for their production — *value of animal production per unit of capital inputs used for their production — *value of total final production per unit of capital inputs — *value of total gross production per unit of capital inputs 	<ul style="list-style-type: none"> — measures to be established 	<ul style="list-style-type: none"> — measures to be established

B. COMMERCIALIZATION OF AGRICULTURE

<p>1. degree of commercialization</p>	<ul style="list-style-type: none"> — percentage of particular crops and animal products used on place for consumption, for reproduction and sold (delivered off holding) — percentage of crop production used on place for consumption, for reproduction (seeds, feeds, etc.) and sold (delivered off holding) — percentage of animal production used on place for consumption, for reproduction (milk, fed, etc.) and sold (delivered off holding) — *percentage of total final production used on place and sold — percentage of total gross production used on place for consumption, for reproduction and sold (delivered off holding) 	<ul style="list-style-type: none"> — degree of commercialization (percentage rate of commercial to total gross or final production) 	<ul style="list-style-type: none"> — dominant degree of commercialization: very high, high, medium, low, very low (thresholds to be established)
<p>2. level of commercialization (=of commercial production)</p>	<ul style="list-style-type: none"> — amount of particular crop or animal products sold (delivered off holding) per unit area — total crop production sold (delivered off holding) per unit area of agricultural land — total animal production sold (delivered off holding) per unit area of agricultural land — total agricultural production sold (delivered off holding) per unit area of agricultural land — total agricultural production sold (delivered off holding) per one employed in agriculture 	<ul style="list-style-type: none"> — commercial production in monetary or conventional units per unit of agricultural land — commercial production in monetary or conventional units per one employed in agriculture 	<ul style="list-style-type: none"> — agricultural production per agricultural population

C. DOMINANT ENTERPRISES (ORIENTATION, COMBINATION OR EMPHASIS ON LEADING ELEMENTS OF AGRICULTURAL PRODUCTION)

1. agricultural orientation (emphasis)	<ul style="list-style-type: none"> — percentage share of particular crops in total crop production — percentage share of particular animal products in total animal production — percentage share of particular agricultural products in gross production — *percentage share of particular agricultural products in final production — orientation (combination) of agricultural production (method to be accepted) 	<ul style="list-style-type: none"> — percentage share of principal crops in total crop production — percentage share of principal animal products in total animal production — percentage share of principal agricultural products in gross production 	<ul style="list-style-type: none"> — dominant orientations (combinations) of agricultural production
2. specialization of agriculture	<ul style="list-style-type: none"> — percentage share of particular crops and animal products in the commercial part of agricultural production — degree of specialization: percentage ratio of primate agricultural products in commercial production (or defined otherwise) — orientation (combination) or commercial production (dominant enterprises in commercial production), methods to be accepted 	<ul style="list-style-type: none"> — degree of specialization — orientations (combinations) of commercial production (of agricultural specialization) 	<ul style="list-style-type: none"> — dominant degree of specialization — dominant orientations (combinations) of commercial production

Jerzy KOSTROWICKI

TYPES OF AGRICULTURE IN POLAND
A PRELIMINARY ATTEMPT
AT A TYPOLOGICAL CLASSIFICATION

There are two principal methodological problems in agricultural typology:

1 — the choice of criteria and their adequate expression in terms of indices or structures representing various properties of agriculture

2 — the method of combination or integration of these properties or, in another word, of grouping the individual basic units of study according to their similarity as to the characteristic pattern of their agricultural properties.

In the selection of criteria the present attempt is based on the up-to-date results obtained by the I.G.U. Commission for Agricultural Typology¹. The typology is based on the internal or inherent characteristics — or properties of agriculture only, while the external natural and other conditions in which agriculture develops serve to explain why the particular type of agriculture has been developed and formed at a given time and place.

The type of agriculture, understood as a supreme notion focusing all the important properties of a given agriculture,

¹ J. Kostrowicki, N. Helburn. *Agricultural Typology. Principles and Methods. Preliminary Conclusions*. I.G.U. Commission for Agricultural Typology. Boulder. Colorado, 1967, 37 p.

is to be determined on the basis of the three principal groups of criteria:

1. Social and ownership criteria responding to the question, "Who is the producer?"

2. Organizational and technical criteria responding to the question, "How — by what means is production obtained?"

3. Production criteria responding to the question, "What is produced and for what?"

Since the IGU Commission has not recommended as yet any particular method of combining the characteristics representing these criteria, the graphic method of typograms² has been applied being fully aware of all its shortcomings.

The following indices representing various agricultural characteristics have been accepted and used to construct typograms for each county (powiat) of Poland.

A. Social and ownership characteristics:

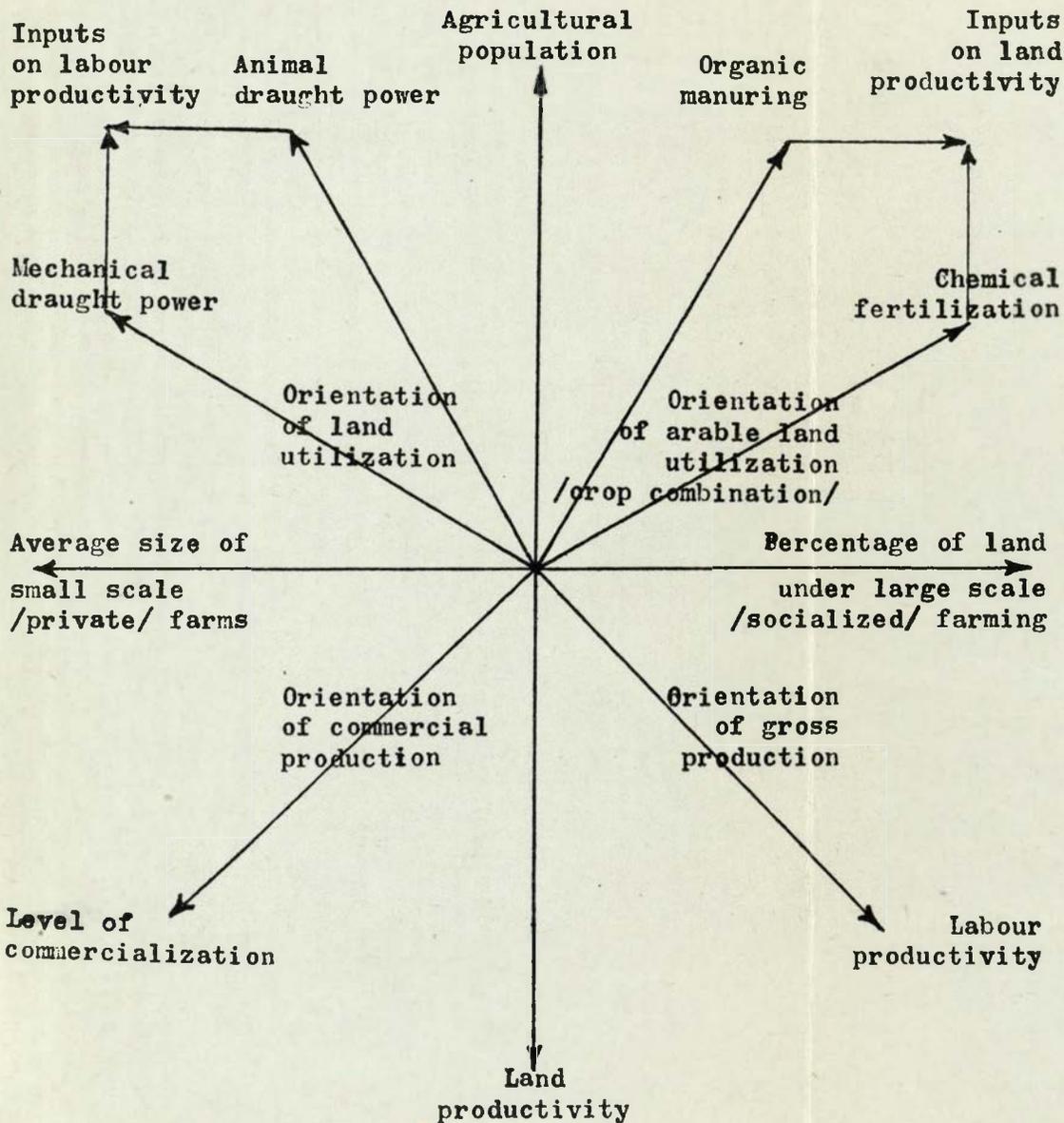
1. Average size of small-scale private holdings.
2. Percentage share of agricultural land under large-scale socialized (state and collective) farming.

B. Organizational and technical characteristics:

3. Density of agricultural population per 100 ha of agricultural land.
4. Animal power — number of horses per 100 ha of agricultural land.
5. Mechanical power — number of tractors per 100 ha of agricultural land.
6. Organic manuring — number of farm animals in conventional units per 100 ha of agricultural land.
7. Mineral fertilizing — the amount of fertilizers in pure content (NPK) per 100 ha of agricultural land.

² Known also in cartographic literature as star diagrams, radiographs or radiograms being the evolution of econographs introduced many years ago by Griffith Taylor.

S C H E M E O F T Y P O G R A M



<http://rcin.org.pl>
 Fig. 1 The typogram applied to the present study

C. Production characteristics:

8. Land productivity — gross agricultural output in grain units per 1 ha of agricultural land.
9. Labour productivity (labour effectiveness) — gross agricultural production in grain units per 1 person of agricultural population.
10. Level of commercialization — commercial production in Zlotys per 1 ha of agricultural land.

These indices were distributed on the branches of typogram in the way illustrated by Figure 1. Figure 2 illustrates a possible arrangement of indices in comparative studies of broader extent covering different countries.

The structural characteristics that could not be expressed by indices defined and presented in a formalized way (by formulas) were marked by colours in the center of each typogram³. They include:

12. Orientations in land utilization.
13. Orientations in utilization of arable land (crop combinations).
14. Orientations in agricultural (gross) production.
15. Orientations in commercial production of agriculture.

On the basis of the size, shape and colour of their typograms individual units (powiats) were grouped into types of various order. In case of powiats of transitional character the ranges of particular types were corrected on the basis of literature and various studies made at the Department of Agricultural Geography of the Institute of Geography, Polish Academy of Sciences. As this involves certain subjectivity, these units could otherwise be classed as being of transitional character, between the types of various order.

³ Cf. appendix to 1. For more details see: J. Kostrowicki. Some Methods of Determining Land Use and Agricultural Orientations as Used in the Polish Land Utilization and Typological Studies. *Geographia Polonica* 18, 1970, pp. 93—120.

As not all of the accepted indices are considered to represent best particular characteristics and some others, while important, could not be applied for various reasons and as not all the data used were computed for the same year (mostly for about 1960) the present typology should be considered as a preliminary attempt only, outlining the path for future investigations rather than accurately solving the problem. The combined indices for private and socialized farming in the framework of powiats could also be explained by the lack of separate data. The problem of nomenclature to be used for the defined types also has not been solved as yet. The use of geographic names means really nothing; those based on agricultural characteristics are usually too long and too complicated. Consequently, the types were only numbered provisionally and then characterized.

Without considering the place of particular types in the whole system of agricultural types of Europe or of the World, eight types of agriculture were distinguished in Poland, differing first and foremost by their peculiar arrangements of indices, representing production characteristics of agriculture (land and labour productivity and level of commercialization) with which other indices usually were either correlated or could be used to explain these arrangements.

Within the eight types, numerous subtypes were defined⁴. They differ less in their production indices but more in their orientations.

The distribution of types and subtypes distinguished by means of this procedure is shown on the Fig. 3. Typograms for some powiats representing them see Fig. 4. The brief characteristics of particular types and some remarks about their dynamics and future possibilities are as follows:

1. Medium or highly effective (over 50 grain units-GU —

⁴ For a more detailed description see: J. Kostrowicki, R. Szczyński. *Rolnictwo /in/ Struktura przestrzenna gospodarki narodowej*. Warszawa 1969, pp.17—124.

FULL RECOMMENDED TYPOGRAM

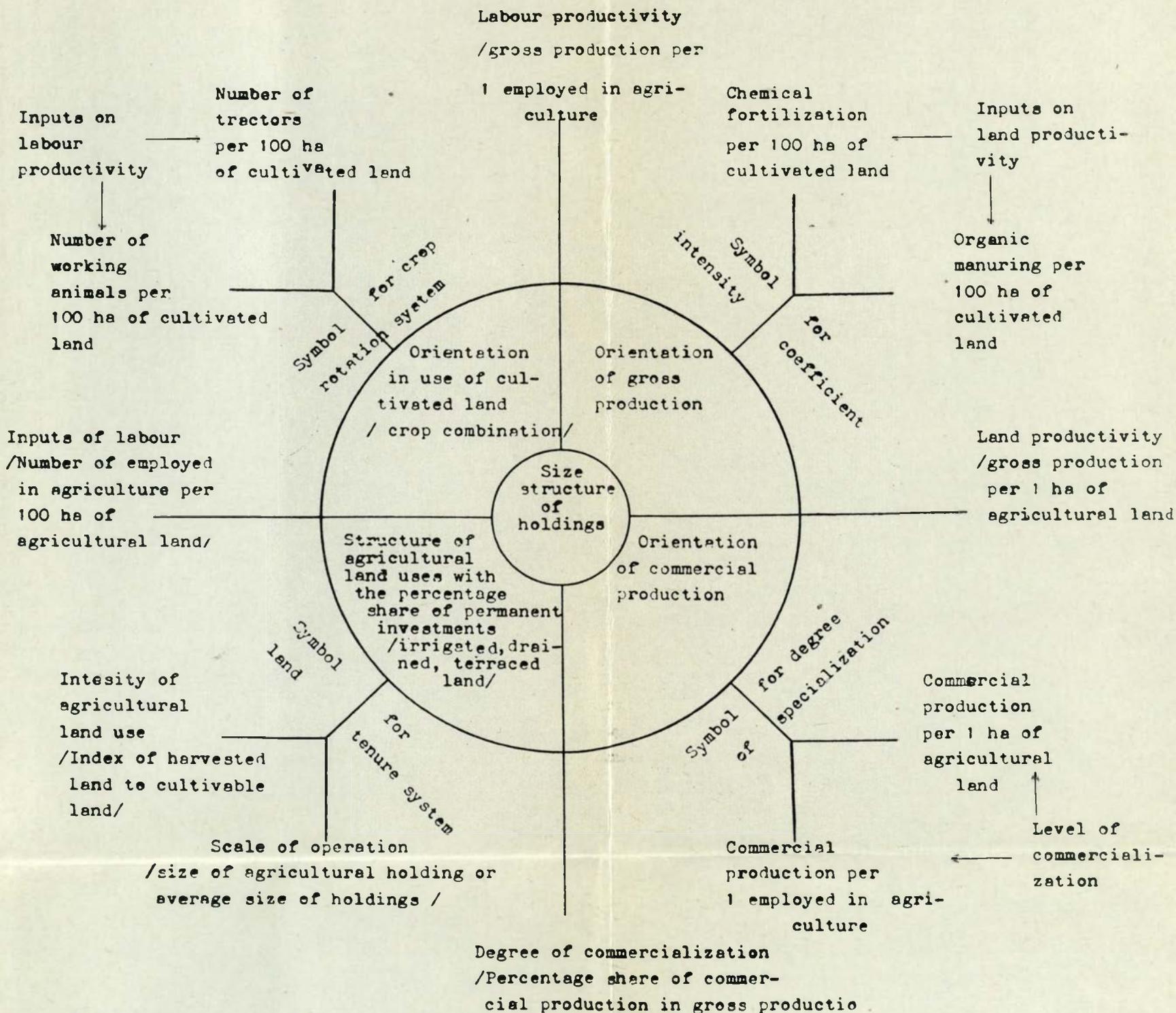


Fig. 2 Recommended typogram for broader comparative studies

per one person of agricultural population — AP), medium commercial (2—4 thousand Zlotys per hectare of agricultural land —AL), low productive (below 24 GU per one ha AL) agriculture, dominating in northern and north-western Poland, is in fact of dual character. Large —scale, socialized, mainly state farming with low inputs of labour, high mechanization and high chemical fertilizing, occurs together with individual private farming derived mainly from the post-war settlement, with farms of medium size (7—10 ha) with medium inputs of labour, that are less mechanized and apply less chemical fertilizers and medium organic manuring. The most common production orientations are rye or rye-oats with potatoes (sometimes also with clover or meadow hay) and dairy-cattle breeding. In commercial production dairy products come to the forefront with rye and potatoes (sometimes also wheat, sugar-beet or pork) as secondary elements. A similar type of farming is practised in the Sudety Mountains (Subtype 16).

The extent of this type of agriculture is gradually shrinking and is being replaced by the more productive type two, particularly in Szczecin and Zielona Góra Voivodships. As land productivity is at a minimum there, further development of this type of agriculture, in view of low labour resources, ought to be based on the increase of capital inputs — mainly fertilizing— and the introduction of more productive crops and animals.

2. Medium effective (40—60 GU/1AP), medium commercial (2—4 thousand Zlotys per hectare AL) and medium productive (20—28 GU/1ha AL), agriculture with prevalent private farming, medium inputs of labour, low or medium mechanization, medium or low chemical fertilizing, and medium organic manuring. Socialized farming, which plays a less important role, does not differ from the preceding type. This type of agriculture is practised mainly in the large areas surrounding Greater Poland (Wielkopolska) from Northwest, West and Southwest. This is not without reason as these areas have been colonized following World War II, mainly by settlers

from Greater Poland. Agriculture in the western bordering powiats of Olsztyn Voivodship is of similar character.

The production orientation does not differ much from the Type 1. It is usually rye with potato, rye-potato or rye-meadow hay with serradella, clover, sometimes with wheat, as well as with dairy cattle. In the orientations of commercial production, animal production (dairy products and pork) is a leading element with crops such as rye, sometimes wheat, potatoes, and sometimes sugar-beet playing a secondary role.

In general, Type 2 could be considered of transitional character between Type 1 and Type 3.

Because of the level of production indices, highly differentiated Cassubian agriculture (Subtypes 21, 22) with predominant private farming was also included into this type.

The further development of this type of agriculture through its intensification and the resulting increase in productivity ought to tend toward assimilation with the Type 3, because of the poorer natural conditions, in its less productive form.

3. Highly effective (over 50 GU/1 AP), highly commercial (over 4 thousand Złoty/1 ha AL), highly or medium productive (over 28 GU/ 1 ha AL) agriculture with preponderant medium size or larger private farming, with medium inputs of labour, relatively high mechanization, high chemical fertilization, and high organic manuring. Large-scale socialized, state, and collective farms that obtain similar production results are less numerous there. On more fertile soils wheat (sometimes with malting barley), sugar-beet orientations with clover, lucerne or meadow hay and cattle raising (sometimes also pig) are prevailing. In less favourable natural conditions they are substituted by wheat-rye, rye or rye-potato orientations (sometimes with sugar beets) with cattle and pig breeding.

The agriculture of this type, the best in Poland, in its various subtypes is practised over large areas of Greater Poland, along the lower Vistula including polder agriculture on its delta (Żuławy) as well as in Lower and Opole Silesia. In the future it ought to develop harmoniously all its essential

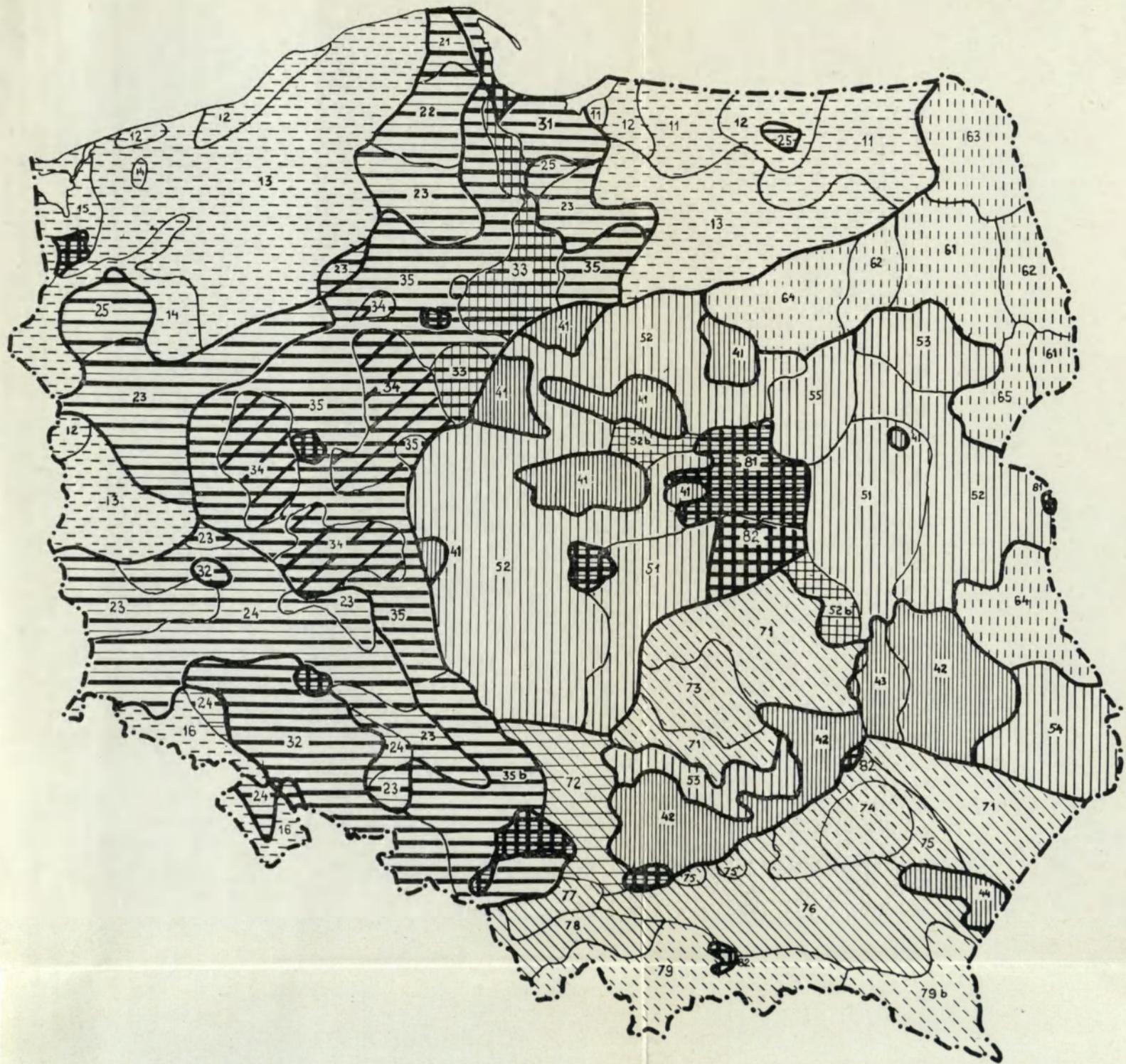


Fig. 3 Types agriculture in Poland. First numbers mean number of type, the second those of subtypes of agriculture. For the description see text.

characteristics, following the demands of the country's economy.

4. Highly productive (over 32 GU/1 ha AL), highly commercial /4—6 thousand Zlotys (1 ha AL), but medium effective (40—60 GU/1 AP) agriculture with high dominance of medium or small-size private farming, with high labour inputs, but medium or low mechanization, medium or low fertilization, and medium or high manuring, is dispersed in some areas of Central and Southern Poland. Production is oriented there toward rye or rye-wheat with potatoes and sometimes sugar beet, clover, as well as cattle and pig breeding. In the commercial production industrial crops, such as sugar beets and more locally tobacco, come to the forefront together with animal, both dairy and pork products, with cereals — rye and wheat playing a secondary role.

Unlike the Type 3, highly productive results are obtained there on the fertile soils with traditional methods of farming, with high labour inputs rather than with capital inputs. In contrast to Type 3, which has spread from the best sites to less favourable areas using high capital inputs and modern farming methods, Type 4 is in fact limited to areas with the best natural conditions. It should be stressed, however, that in the last years the territorial scope of the Type 4 has been extending on the fertile loess and chernozem soils in the South, as well as in the North where the Subtype 41, the closest to the Type 3, has been spreading over less fertile soils formed on glacial sediments. In the South the extent of the Type 4 is limited to the best soils, and does not even cover all of them, in the Northwest it extends beyond the good soils and is closely connected with the distribution of sugar factories. This trend shows also the direction of the further development of this type of agriculture. As labour productivity is at a minimum there the progress could be achieved mainly by capital inputs of the mechanization of labour. With an increase of chemical fertilizing the expansion of this type of

agriculture over less favourable sites will be greatly facilitated.

5. Medium or high productive (24—36 GU/1 ha AL), low or medium commercial (2—5 thousand Zlotys /1 ha AL), and low effective (below 50 GU/1 AP) agriculture, with the dominance of medium or small size private farming, with medium or high labour inputs, low or medium mechanization, low or medium chemical and medium organic fertilizing. This type of agriculture is most common in Central Poland. Production orientations of potato, rye-potato, or rye with potatoes, with clover or seradella, as well as with cattle and pig breeding are dominant here, while in the commercial production pork and/or dairy products lead with rye and potatoes as secondary elements. In some of these areas the range of commercial products has recently been extended to include tobacco or fruits and vegetables, forming different subtypes (52).

As both labour productivity and commercialization of agriculture are at a minimum there, its future development should envisage not only the further increase of high productive, although labour-absorbing branches of crop cultivation and animal breeding, but also the increase of the size of farms by outflow of agricultural population to other enterprises. In some places such a development would lead toward transformation of this type into Type 4.

6. Low commercial (below 3 thousand Zlotys /1 ha AL), low productive (below 24 GU /1ha AL), and medium effective (40—50 GU/1 AP) agriculture with the dominance of medium size farming, medium labour inputs, low chemical fertilizing, and low or medium organic manuring. The orientations in agricultural production do not differ greatly there from the preceding type; they are, however, less intensive. Rye or rye-oats orientations with potatoes, meadow hay, serradella or lupine, as well as cattle and pig breeding are dominant there with dairy and pork commercial orientation and rye and potatoes playing a secondary role. In the Subtype 63 the

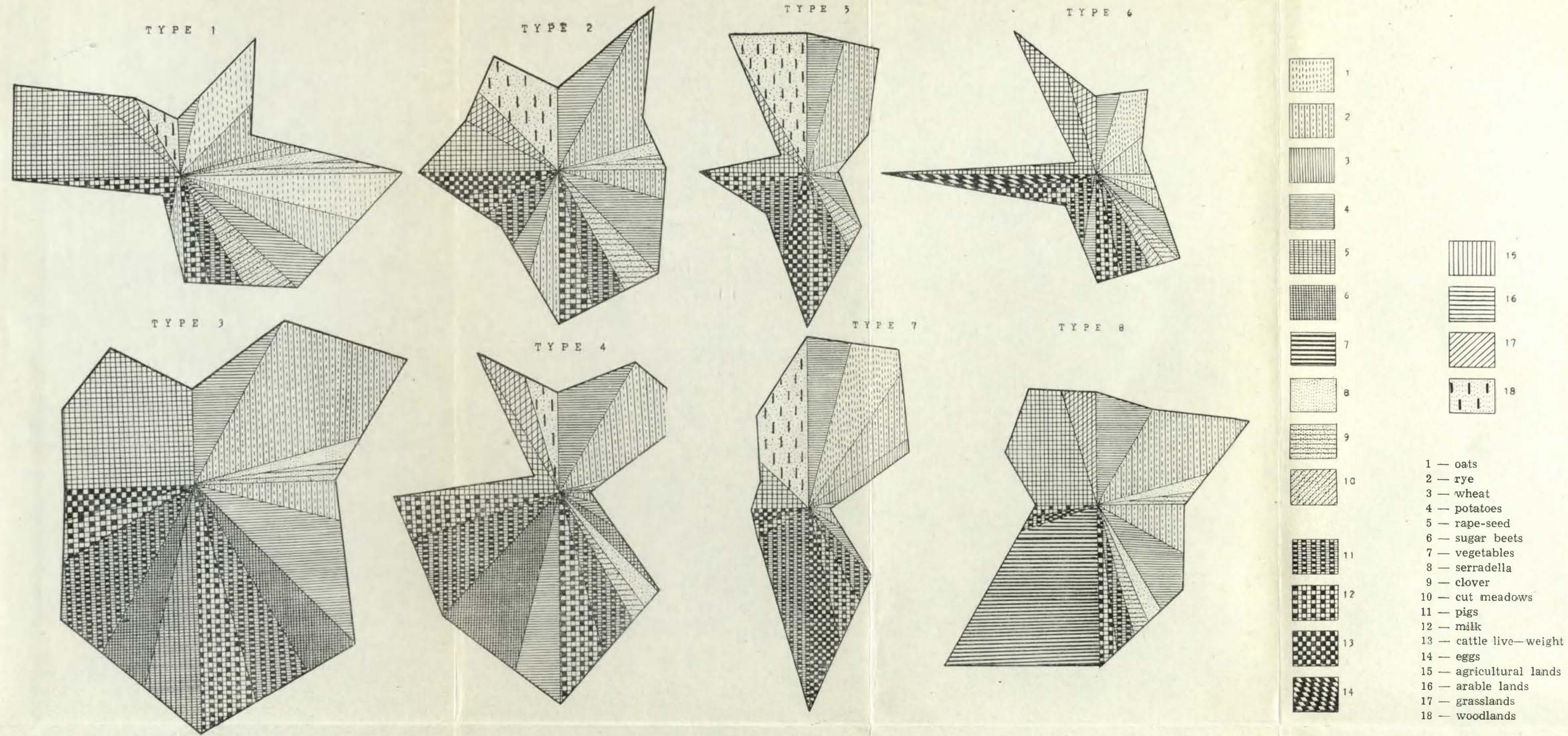


Fig. 4 Typogram of agricultural characteristics for selected powiats representing various types of agriculture.

- Type 1 — Goldap
- Type 2 — Gorzów Wielkopolski
- Type 3 — Gostyń
- Type 4 — Radziejów
- Type 5 — Wyszaków
- Type 6 — Suwałki
- Type 7 — Nowy Targ
- Type 8 — Pruszków

commercial orientation has been enlarged by the postwar introduction of tobacco.

Because of unfavourable natural and historical conditions and peripheral position in the Northeast, this type represents the most retarded agriculture in Poland, with a number of relics from the past such as high land fragmentation, field compulsion, and three-field system with bare or cultivated fallow, common pastures, etc. It is also characterized by traditional methods of land cultivation with low-effective hand-tools and little machinery. Medium level of labour productivity results there from both the larger size of farms, often containing the extensive areas of low — productive meadows and pastures, and not so high density of agricultural population. As land productivity is in minimum there its increase could be obtained only by intensification of farming, i.e. by the increase of labour and capital inputs which are directed towards more intensive orientations of crop and animal production. The recent expansion of more intensive Subtype 52 in the areas of Type 6 and the intensification of formerly backward agriculture in the areas between the middle Vistula and the lower Bug, now Subtype 52, and finally the recent trends in agricultural development in the central part of Białystok Voivodship, all these demonstrate that such an intensification is possible on the condition that fragmented villages are consolidated, higher inputs on land improvement, and fertilizing and other ways of increasing land productivity are introduced.

7. Low effective (below 40 GU/1 ha AP), low or medium, seldom high productive (20—36 GU/1 ha AL), low or medium commercial agriculture with predominant small- or very small-scale private farming, with highly fragmented lands, high labour inputs but low mechanization, low mineral fertilizing and high organic manuring, mixed crop-animal production orientations, with predominant dairy-cattle breeding, and commercial orientations based highly on animal, mainly dairy products. This type is characteristic for large

areas of southern Poland. According to the elevation above the sea level and the quality of soils various crops dominate there such as wheat, rye and oats among cereals, and clover and meadow hay among hay crops. Potatoes are cultivated everywhere.

As labour productivity is in minimum there, further development of agriculture would require both the outflow of labour surpluses and the introduction of more productive, although labour absorbing orientations of agriculture. As this type occurs partly in the mountains where the mechanization of agriculture is difficult or impossible, the modernization of agriculture might lead to the withdrawal of agriculture from some most unfavourable sites and their conversion into forests or else the transformation of the arable system of land use to mixed, intercalary, field-pastoral or pastoral systems little known in Poland, and in some cases to permanent crop (fruit trees) or mixed fruit crop — pastoral system applied in the mountainous areas in other countries.

8. Highly commercial (over 6 thousand Zlotys /1 ha AL), highly or medium productive (over 28 GU / 1 ha AL), medium effective (below 50 GU /1 AP) mostly private farming, specialized in vegetable, fruit or mixed vegetable — fruit production, with high inputs of labour, low mechanization, high organic manuring and medium chemical fertilizing has developed not only in the suburban zones of big cities but also, although not so frequently, elsewhere. The largest area covered by this type of agriculture is around Warsaw, which already before World War I supplied the market of St. Petersburg with vegetables. In the interwar period this agriculture expanded but not to such a degree as during the postwar two decades. Now it supplies not only the Warsaw market and those of other big Polish cities but sends increasing amounts of fruit and vegetables for export. At the same time a sectorial pattern of agricultural specialization has developed in the suburban zone of Warsaw with each sector specializing in

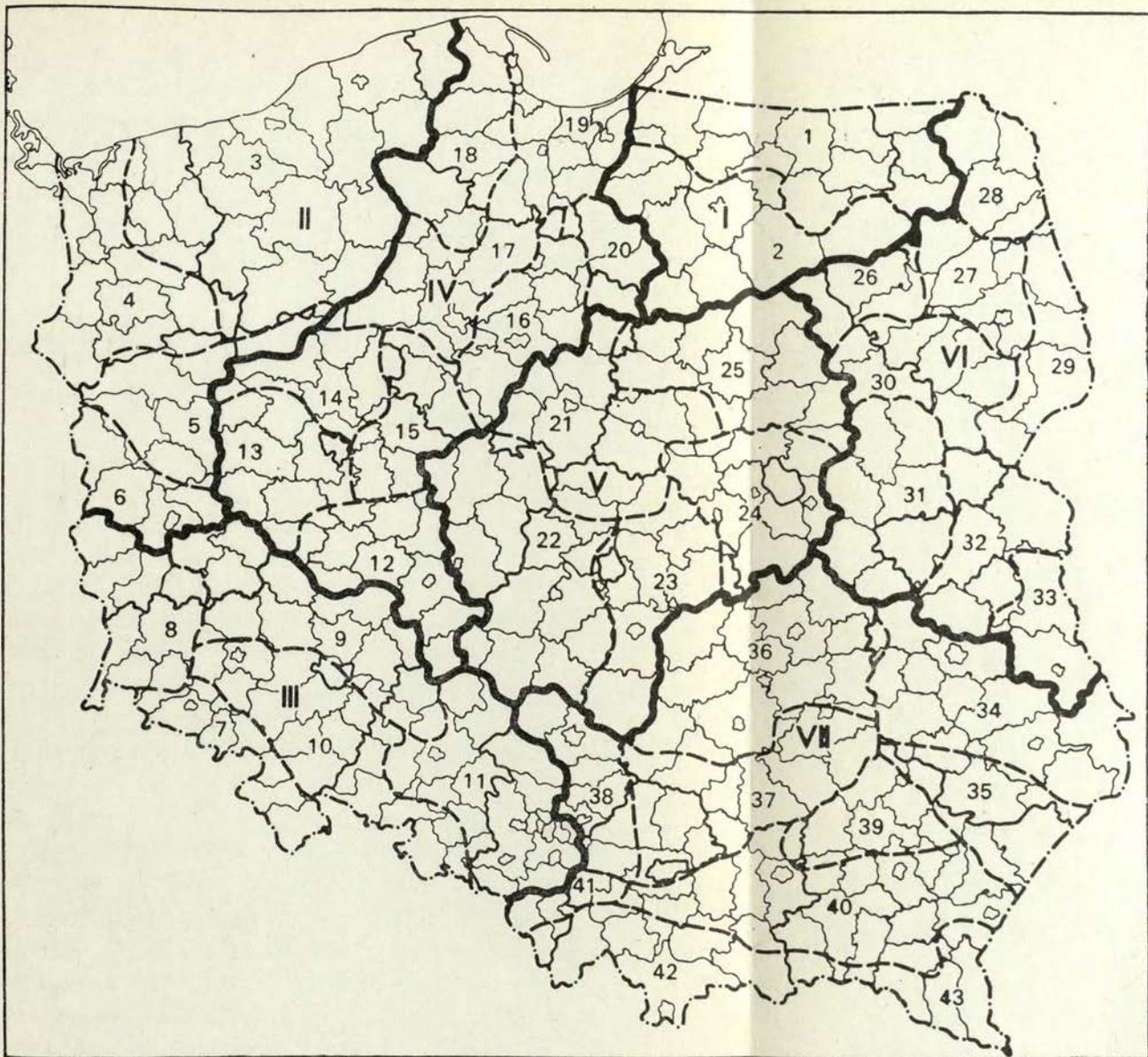


Fig. 5 Agricultural regions of Poland

I—VII regions

1—43 subregions

various kinds of vegetables, early or late potatoes, hard or soft fruit, strawberries, fresh milk, etc. Beside these commercial products some cereals or legumes are cultivated for internal consumption or for agronomic reasons. They usually rotate with vegetables and potatoes or are intercultivated with fruit trees and shrubs. For the same reasons some cattle or hogs are kept everywhere while poultry is bred mainly for the market.

The generalization of the more complicated picture of agricultural types, based on the dominance or co-dominance of particular types or subtypes in particular areas has led to the delimitation of seven agricultural regions and 43 sub-regions (Fig. 5).

Information presented so far may lead to a conclusion that with the development of agriculture and the change of its characteristics, the extent of agricultural types and the limits of regions are continuously changing. For this reason the given picture as presented here is already, at least partly, out-of-date and the study is to be repeated for 1970. This contributes also to the practical utility of typological and regionalization studies of agriculture.

Observing the past and present tendencies one may foresee some future trends in the development. Observing some more productive, more effective, and more commercial types, one may evaluate the possibilities of transforming less developed agriculture which occurs in similar external conditions and may suggest eliminating the conditions or characteristics which being in minimum, hamper its development or create conditions that would stimulate such a development.

Finally, agricultural typology and regionalization are the best basis for planning agricultural development. In this case it can mean the definition of the future types of agriculture and agricultural regions, desirable and attainable in a given

time and place on the basis of the investigations of the present external conditions and forecasting future conditions and demands. The last stage in this procedure would be to determine the manner in which to pass from the present to the future types and regions.

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